The Development of the Children's Future Thinking Questionnaire: Establishing Validity and Reliability

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Abstract

Future-oriented cognition, the ability to anticipate future states and needs (Bélanger, Atance, Varghese, Nguyen, & Vendetti, 2014), is a critical skill that children must develop for successful daily functioning. Research in the field of future-oriented cognition relies heavily on behavioural tasks to measure future-oriented abilities in young children, yet these tasks have several limitations such as low ecological validity and only providing information about the child on a single occasion and in one context (the laboratory). The current study sought to address the limitations of behavioural tasks by developing a parent-report questionnaire on children's future-oriented cognition (saving, prospective memory, episodic future thinking, planning, and delay of gratification). The reliability and validity of the Children's Future Thinking Questionnaire (CFTQ) were examined in three studies. In Study 1, the CFTQ was administered to parents online to test whether the newly developed measure was suitable for administration to parents and whether it detected age-related increases in children's future-oriented cognition. Study 1 provided initial evidence for the reliability of the CFTQ and showed that parents could detect age-related increases in their children's future-oriented abilities. Study 2 involved (a) administering the questionnaire to a larger sample of parents to further examine scale reliability (Study 2A) and (b) bringing a subset of these parents and their children into the laboratory to examine relations between CFTQ responses and children's behavioural performance on future-oriented cognition tasks (i.e., validity; Study 2B). Results of Study 2A confirmed high internal consistency reliability of the CFTQ and provided further support for children's age-related increases in future-oriented abilities. Study 2B showed some evidence for the validity of the CFTQ, suggesting that parents may be able to accurately report on their children's future-oriented cognition in some domains. Overall, the CFTQ is a useful addition to the field of future-

oriented cognition as the first parent-report measure to assess the development of future-oriented cognitive abilities.

Keywords: future-oriented cognition, parent-report, reliability, validity, child cognition

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General Introduction

The ability to anticipate future states and needs (Bélanger, Atance, Varghese, Nguyen, & Vendetti, 2014), known as future-oriented cognition, is a critical skill that children must develop for successful daily functioning and planning. Failure to orient oneself towards the future may have negative consequences for academic performance and personal safety, as well as social functioning (Mahy, Moses, & Kliegel, 2014). For example, a child who forgets to bring their show and tell item to school may suffer negative academic outcomes—that child may miss an important opportunity to practice language and presentation skills. Alternatively, a child who forgets to bring a gift to their friend's birthday party may experience negative social consequences—that child may not be invited to their friend's party again. Notably, negative outcomes associated with children's difficulty with future thinking and planning extend into adulthood. In fact, research shows that better future-oriented abilities in childhood, in domains such as delay of gratification, are predictive of important positive long-term outcomes, such as better mental and physical health, personal finances, postsecondary educational attainment, and reduced chances of criminal offending (e.g., Moffitt et al., 2011; Shoda, Mischel, & Peake, 1990). Thus, the accurate and reliable measurement of future-oriented cognition during childhood is important in determining the early development of this critical skill, predicting long-term outcomes into adulthood, and potentially intervening with children who have low or delayed future-oriented cognitive ability.

The Development of Future-Oriented Cognition

Around the age of three, children begin to develop the ability to think about, plan for, and anticipate the future, as well as remember to carry out their future intentions (Atance & O'Neill, 2005; Kliegel & Jäger, 2007). Though children often struggle with accurately thinking and

planning for the future at this young age (e.g., Hayne, Gross, McNamee, Fitzgibbon, & Tustin, 2011; Atance, 2008), by five or six years of age this ability is much improved (Atance & Meltzoff, 2005). However, temporal distance of future events may play a role in how successful children are at judging the future. For example, Friedman (2000) asked 4-to-10-year-olds to make temporal judgements about future events (e.g., birthday, Christmas). Friedman (2000) found 4-year-olds struggled to distinguish between events in the near future and events a few months away, suggesting that young children may struggle to understand temporal distance. However, by 5 years old, children are better able to distinguish temporal distances of events and by 10 years old, children's ability to make judgments of future events resemble that of adults (Friedman, 2000). Importantly, research finds that children's past and future judgments of temporal distances are unrelated, which suggests temporal knowledge of past and future events may draw on different developmental processes (Hudson & Mayhew, 2011).

In general, development of future-oriented abilities in children improves with age; however the developmental trajectory of future orientation may depend on the specific ability examined. Thus, it is important to investigate the development of future-oriented cognition in the multiple domains that encompass this ability. For example, a child's ability to remember to bring their toy for show and tell the next day is distinct from a child's ability to plan what toy might be appropriate to bring for show and tell, yet both abilities share common elements in that they require a child to orient themselves towards the future. Thus, children's future-oriented cognition encompasses many different abilities. For the purpose of the current study, five abilities of future-oriented cognition (i.e., saving behaviour, prospective memory, episodic future thinking, planning, and delay of gratification) will be explored. Next, literature on the development of these five domains in childhood will be reviewed.

Saving behaviour. Saving behaviour focuses on children's ability to reserve resources in the present for the sake of future enjoyment (Metcalf & Atance, 2011). In contrast to delay of gratification, which may only involve delaying reward on one occasion, saving for the future is thought to involve a series of choices to postpone use or consumption of a resource (Otto, Schots, Westerman, & Webley, 2006). Recently, Metcalf and Atance (2011) developed a behavioural task to measure saving behaviour in young children. In this task, children were first introduced to a room that contained a smaller, less exciting marble game and then introduced to a second room that contained a larger, more exciting marble game. The main variable of interest was how many marbles the child saved for use in the second room, with the larger, more appealing marble game. Using the marble game, Metcalf and Atance (2011) found 4-, 5-, and 6-year-olds did not differ in the number of marbles they saved for the larger, more exciting marble game. All children regardless of age saved more marbles when the future reward was more desirable than the present reward (i.e., when the more exciting marble game was in the second room). In contrast, a recent study using the marble game found support for age-related increases in 3-to-5-year-old children's saving behaviour (Atance, Metcalf, & Thiessen, 2017). Research measuring savings in older children also suggests an age-related increase in savings ability. Otto et al. (2006) found that in a board game where children are given the opportunity to buy toys, save money, and avoid temptation, 6-year-olds spent more tokens on toys than 12-year-olds. Additionally, 6- and 9-year-olds deposited fewer tokens in the bank than 12-year-olds. Thus, older children used more sophisticated saving strategies; however, this did not translate into better saving in older children compared to younger children (Otto et al., 2006). In the current study, I expect to find that older children save more than younger children. However, the small body of literature investigating children's ability to save for the future provides mixed evidence

as to whether there are age- related increases in saving ability especially in preschool-aged children.

Prospective memory. The second domain of future-oriented cognition, Prospective memory (PM), is defined as the ability to remember to carry out future intentions (Atance & O'Neill, 2001; Kliegel & Jäger, 2007; Einstein & McDaniel, 1990). In general, PM involves three separate steps: (1) developing a plan for the future, (2) remembering the plan, and (3) remembering to carry out the plan at a specific point in the future (Atance & O'Neil, 2001). Thus, PM is measured in young children using behavioural tasks that incorporate this three-step process. In general, the PM paradigm introduces a plan for the future, where the experimental task and the PM intention are introduced, followed by a filler task where the child must remember the PM intention during a delay period. After the filler task, children complete the experimental task during which they have to remember to carry out the PM intention (Kvavilashvili, Kyle, & Messer, 2008).

The card sort task (e.g., Kvavilashvili, Ebdon, & Messer, 2001; Mahy & Moses, 2011) is a commonly used behavioural measure of PM. The card sort task involves an ongoing activity and a prospective intention embedded within the ongoing activity. For example, children might be given a stack of cards with pictures of everyday objects on them (e.g., apple, chair) and asked to name each object on the card (ongoing activity). Embedded in the stack of cards are pictures of animals (PM cues), which the child is instructed to hide in a box behind them (PM intention) when they appear in the stack of cards. On card sort tasks, older children tend to be more successful in carrying out the PM intention than younger children (e.g., Mahy & Moses, 2011). For example, 2- and 3-year-old children perform quite poorly, 4-to-6-year-old children show some improvement in performance, and 7-year-old children are fairly good at remembering to

carry out the prospective intention (Kvavilashvili et al., 2001; Kliegel & Jager, 2007). PM has also been investigated in slightly older children (i.e., 6-to-12-year-olds) using a car driving simulation task—The CyberCruiser (Kerns, 2000). In this task, children win points as they drive a vehicle down a road, but they also must monitor the car's available fuel and remember to refuel the car when it reaches a certain level. Kerns (2000) found age-related increases in PM ability with younger children running out of fuel more frequently than older children. Thus, research supports the idea that PM ability increases over the course of childhood.

Episodic future thinking. The third domain of future-oriented cognition, episodic future thinking (the ability to mentally project oneself into a future situation or event; Atance & O'Neill, 2001), shows a similar developmental trajectory to PM. Using the Picture-Book task, Atance and Meltzoff (2005) found that older children were better than younger children at anticipating future physiological states likely to be experienced in particular locations. More specifically, when given a choice of three items (e.g., soap, sunglasses or a seashell) to bring with them to a given location (e.g., a desert), 4- and 5-year-olds scored significantly higher than 3-year-olds in choosing the correct item (Atance & Meltzoff, 2005). Importantly, verbal measures of episodic future thinking show a similar developmental pattern. For example, the Tomorrow Task requires children to verbally report something they are likely to do tomorrow (Busby & Suddendorf, 2005). On this task, the majority of 4-year-old children were able to produce correct answers to future questions compared with a minority of 3-year-olds. However, 4- and 5-year-olds appeared equally capable of reporting events likely to occur in the future (Busby & Suddendorf, 2005).

Further, Suddendorf & Busby (2005) also used the Two-Rooms Task to measure episodic future thinking in young children. Though there are variations of this task, children generally

spend time in two rooms and they are asked to select one item from a room to bring with them into another room. For example, first children are introduced to an empty room with only a puzzle board and then they are introduced to an active room with toys. Before going back to the empty room, children are given the choice of four toys (one of which is puzzle pieces) to bring with them to the empty room. Children who bear the future in mind should select puzzle pieces to bring with them to the empty room to reduce boredom. This behavioural task and its variations show that in general, older children (e.g., 4- and 5-year-olds) consider the future when selecting toys more often than younger children (e.g., 3-year-olds; Suddendorf & Busby, 2005; Suddendorf, Nielsen, & von Gehlen, 2011). Overall, studies examining episodic future thinking show age-related increases in episodic future thinking ability in early childhood across a variety of behavioural measures.

Planning. Forming goals, constructing plans, and envisioning the actions necessary to achieve those future goals (Atance, 2008; Shapiro & Hudson, 2004) describes the fourth domain of future-oriented cognition— the ability to plan for the future. Planning is primarily measured using three types of lab-based tasks: tower tasks (e.g., Tower of Hanoi; Simon, 1975, Monkey Jumping Game; Carlson, Moses, & Claxton, 2004), route tasks (e.g., Truck Loading; Carlson et al., 2004) and script-based tasks (e.g., creating event scripts for going grocery shopping; Hudson & Fivush, 1991). On Tower tasks, children's ability to plan the movement sequence of items, while adhering to certain sets of rules (e.g., larger items cannot be stacked on top of smaller items), generally increases with age (Atance & Jackson, 2009; Kaller, Rahm, Spreer, Mader, & Unterrainer, 2008). For example, Kaller et al. (2008) found lower planning accuracy in 4-year-olds compared to 5-year-olds using a Tower task that involved planning multiple moves. Kaller et al. (2008) suggested that this improvement between 4 and 5 years old could indicate the

development of planning, with regard to thinking ahead for possible moves to complete the task. However, Tower tasks may be too complex for children younger than 5-years old and thus not a suitable measure of planning in young children (McCormack & Atance, 2011).

Route-planning tasks like the Truck Loading task are also used to measure planning in young children. The Truck Loading task requires children to plan the delivery of invitations to houses on a street in a particular order and following specific rules. In addition to the Truck Loading task, verbal measures of planning ability are also used where children are asked to tell the experimenter a plan for going to a particular location (e.g., plan for going grocery shopping; Hudson, Shapiro, & Sosa, 1995). In general, young children have trouble planning ahead. For example, on the Truck Loading task, Carlson et al. (2004) found 3-year-olds incorrectly ordered the invitations for delivery more often than 4-year-olds. However, there is evidence that children as young as three are still able to construct plans in advance of familiar events, such as formulating plans for going to the beach (Hudson et al., 1995). When comparing children's scripts versus plans for visiting familiar locations, Hudson et al. (1995) found that with age children's plans became more distinct from the plans of other children, while children's scripts remained similar with age. Thus, although young children may begin to develop the ability to plan and use scripts at around age three, more flexible, unique, and adaptive planning may emerge as the child develops. Importantly, as children develop, planning begins to emerge as more distinct from general event, script-based knowledge (Hudson et al., 1995).

Delay of gratification. Delay of gratification (DoG), the final domain of interest, is the voluntary postponement of immediate gratification for the sake of greater future gains (Mischel, Shoda, & Rodriguez, 1989). Though DoG has been measured using the classic marshmallow task (e.g., Mischel, Ebbesen, & Raskoff Zeiss, 1972), choice tasks are also a popular way to measure

this future-oriented ability. In contrast to the marshmallow task, where the variable of interest is the length of time a child resists eating a marshmallow, choice tasks focus on the child's decision to choose an immediate versus a delayed reward. For example, Prencipe & Zelazo (2005) gave children a choice between receiving one sticker immediately and receiving a larger quantity of stickers at the end of the testing session. In general, the ability to delay gratification increases with age (e.g., Mischel & Metzner, 1962). For example, on choice tasks, 4-year-olds were found to choose the delayed reward significantly more than 3-year-olds (Prencipe & Zelazo, 2005).

In general, research in the five key domains of future-oriented cognition (saving, prospective memory, planning, episodic future thinking, and delay of gratification) show that the ability to think about, plan for, and anticipate the future largely develops with age. Although previous research shows mixed results for developmental increases in saving ability, the research in this area is also limited. Thus, the current study seeks to expand on this literature and examine age-related differences in saving behavior, and the other key domains of future-oriented cognition, in children 3-to-7-years old. Beyond age-related differences, it is also important to consider the relation between future-oriented domains and other cognitive functions, which show concurrent development.

Executive Function and Language Ability

During childhood, future oriented abilities develop alongside other, domain-general abilities, such as executive function and language ability. For this reason, it is important to consider how children's future-oriented abilities relate to these other cognitive functions. Executive functioning (EF) encompasses a series of cognitive processes, which are involved in the regulation and monitoring of behaviour, emotion, and social interaction (Anderson, 2002; Carlson, 2005). Examples of these EF skills include working memory, inhibitory control, and

task shifting (Anderson, 2002). Orienting oneself towards the future, which requires inhibiting ones' current state in order to consider ones' future state likely demands EF abilities. This may be particularly true for behavioural tasks where other cognitive abilities, beyond those that they are designed to measure, may be needed to complete the task (Seed, Seddon, Greene, & Call, 2012). Further, the specific executive processes involved in the expression of future-oriented cognition may vary depending on the domain of future-oriented cognition examined. For example, prospective memory, measured using a card sort task, has been shown to relate to EF skills such as working memory (Mahy & Moses, 2011), while delay of gratification is often discussed as requiring inhibition (e.g., Carlson, Moses, & Breton). However, several studies have suggested domains such as episodic future thinking (Hanson, Atance, & Paluck, 2014) and planning (Carlson et al., 2004) may not be related to EF. Relations among future-oriented abilities and other cognitive domains, such as receptive language ability, are also reported in the literature (e.g., Atance and Jackson, 2009). Therefore, controlling for EF and language abilities in the current study is important given the concurrent development and involvement of EF in future-oriented cognition during childhood.

Limitations of the Current Tasks

Despite the extensive research using behavioural tasks for measurement of the key domains of future-oriented cognition (as previously described), there are a number of limitations associated with the behavioural measures currently in use. Children's future-oriented cognition is primarily measured using behavioural tasks in laboratory settings, however these tasks are often accompanied by several limitations. Thus, a goal of the current study is to create a new measure of future-oriented cognition, which will attempt to address some of the limitations of behavioural

tasks. Next, I describe the limitations of behavioural tasks and how the parent-report questionnaire will attempt to overcome them.

First, there is often a lack of coherence among behavioural tasks measuring children's future-oriented cognition. Atance and Jackson (2009) found that laboratory tasks thought to be tapping similar future-oriented abilities (e.g., delay of gratification, planning, prospective memory) failed to correlate with each other after controlling for children's age, which supports the idea that future-oriented cognition is composed of distinct abilities. This presents a problem because it is difficult to determine whether these tasks are truly measuring related future-oriented abilities beyond any shared age-related variance, or if these tasks are simply not capturing the construct well. The current study will address this issue by creating a parent questionnaire, which will be used to assess whether the five key domains of children's future-oriented cognition represent distinct abilities, or whether they are aspects of one core ability.

Second, many future-oriented thinking tasks place a high demand on children's verbal abilities (e.g., the Picture-Book task, Tomorrow Task, script planning tasks,). Younger children's performance on tasks with high verbal demands may be particularly disadvantaged, however it is difficult to determine whether age-related differences reflect a genuine lack of understanding of the future or a lack of ability to verbally express the knowledge that they possess. Though this may be partially addressed by controlling for verbal ability, research suggests that young children may have a concept of the future before they are able to communicate it (Suddendorf & Busby, 2005). Thus, a parent-report questionnaire that places no verbal demands on the child may help resolve this issue.

Third, laboratory measures may lack ecological validity. Laboratory settings are artificial contexts in which measures of performance are confined to one task at one single point in time,

measured on a single visit. Consequently, important aspects of future-oriented cognition that are revealed by children in their everyday social interactions, communications, and behaviour may be overlooked in laboratory settings. Thus, a questionnaire is able to ask questions pertaining to children's future-oriented cognition that reflects their ability in several contexts in their daily life.

Fourth, collecting data in a laboratory generally means a less representative sample and inefficient data collection. Importantly, the sample of children whose parents voluntarily bring them into the laboratory may have economic and social advantages not representative of the general population. Similarly, laboratory measures are fairly inefficient and expensive to carry out with a large number of children, given the time commitment required to test children individually. A parent questionnaire has the advantages of including participants from more diverse economic, social, and ethnic backgrounds due to the ease of online or in-person administration that does not require travel and could also reduce the time and costs associated with bringing children into the laboratory.

Finally, behavioural methods used to measure future-oriented cognition lack the important perspective of the parent. A parent's perspective may be especially valuable when trying to measure very young children's abilities, which are often variable depending on the child's current motivational and physiological state. Indeed, many questionnaires have already been developed to capture the parent perspective on children's abilities and behaviours (e.g., Children's Behaviour Questionnaire (CBQ); Rothbart, Ahadi, Hershey, & Fisher, 2001), which have been shown to be reliable and valid. For example, the Child Social Understanding Scale (CSUS; Tahiroglu et al., 2014) is a newly validated parent questionnaire measure of children's theory of mind. Thus, parent-report measures are used in numerous studies (e.g., CBQ used to study effortful control in relation to aggression and depression in adolescents; Wang, Chassin,

Eisenberg, & Spinrad, 2015) and show that parents are quite accurate in rating their children's abilities. Clearly, the incorporation of the parent perspective using a questionnaire is important for a more complete and accurate understanding of complex child behaviours, such as the development of five key domains of future-oriented cognition.

Given the limitations of behavioural laboratory measures of children's future-oriented cognition, the current study seeks to address the problems of coherence, high verbal demands, as well as the lack of ecological validity, representativeness, and parental insight by creating a new measure. The proposed parent-report measure of children's future-oriented cognition would be an important contribution to the field as it would offer a parent's perspective on children's abilities in various areas of future-oriented cognition (e.g., saving, prospective memory, episodic future thinking, planning, and delay of gratification) in varied contexts (e.g., home, school, extracurricular activities). Importantly, no reliable or valid parent-report questionnaire currently exists to evaluate children's future-oriented cognition.

The Current Study

The overarching objective of the current research is to develop a parent questionnaire to better capture the growth of future-oriented cognition in children 3-to-7- years old. To do this, I will establish a reliable and valid parent-report questionnaire that measures five domains of future-oriented cognition (saving, prospective memory, episodic future thinking, planning, and delay of gratification) in children 3-to-7-years old. The five subscales correspond to prominent domains of future-oriented cognition addressed in the literature, as previously described. The current study will seek to establish a reliable and valid questionnaire on children's future-oriented cognition by incorporating the results of multiple studies. Broadly, the current study will address three main research questions: (1) can the questionnaire detect age-related development

in future-oriented cognitive abilities? (2) does the questionnaire and its five subscales show internal reliability? and (3) does the questionnaire and its five subscales show validity (i.e., are parents able to accurately assess their child's future-oriented cognition)? To answer the first research question, I will examine the relation between parent's questionnaire ratings of their child's future-oriented cognition and their child's age in months. To answer the second research question, after administering the questionnaire to parents, I will examine the internal reliability of the questionnaire and its subscales. Finally, to address the third research question, I will examine the relation between parent's ratings of their children's future-oriented cognition on the questionnaire and their child's performance on corresponding behavioural tasks, respectively. In line with previous research using behavioural tasks, I expect to see age-related increases in parent's ratings of their child's future-oriented cognitive abilities and that parents will be able to report accurately on their child's future-oriented cognition after accounting for differences in other relevant cognitive abilities (i.e., verbal ability and executive control).

To answer the research questions, several studies will be conducted. The first study (Study 1) will build upon previous pilot data (Mahy, Atance, & Moses, unpublished data) by distributing the questionnaire to parents on *Amazon's Mechanical Turk*. Study 1 will be the first step in determining if items on the newly constructed questionnaire are generally understood by parents and are also appropriate for children within the 3-to-7-year-old age group. The second study (Study 2) in this proposed project will be composed of two studies; Study 2A will involve the distribution of the questionnaire to parents in order to assess internal consistency reliability and Study 2B will involve bringing a new sample of parents and their children into the laboratory at Brock University to assess validity. Together, these studies will aid in the creation of a reliable and valid questionnaire measure. The next step and ultimate goal of this research will be to select

particular items in our questionnaire and eliminate other items in order to maximize internal consistency and validity of the scale and its five subscales. Thus, in the future, a shorter more reliable and valid questionnaire will be formed.

Preliminary Research

Initial development of a 22-item questionnaire on children's future-oriented cognition (Mahy, Atance, & Moses, unpublished data) provided the impetus for the creation of a longer questionnaire with multiple subscales. The original 22-item questionnaire was administered to 90 parents and was found to be positively related to 3-to-7-year-old children's future thinking performance measured by four tests in the laboratory (planning for the future, delay of gratification, using an item in the future, and thinking about future states). This pilot data was encouraging as it suggested that parents may be able to accurately assess their children's future-oriented abilities and provided a basis for creating a longer and more comprehensive questionnaire developed in the present study.

Using the pilot questionnaire as a starting point, an 88-item questionnaire, titled the *Children's Future Thinking Questionnaire* (CFTQ) was developed. The CFTQ was composed of five subscales: saving, prospective memory, episodic future thinking, planning, and delay of gratification.

After initial item development, seven scholars in the field, who have published in the field of children's future-oriented cognition, were contacted to provide feedback on the questionnaire items. Based on their feedback, revisions were made to the questionnaire. Nine items were removed based on experts' comments suggesting that these items were either not developmentally appropriate, confusing, too advanced, or unrealistic. Thus, the revised version of the CFTQ was composed of 79 items, with approximately equal number of items per subscale

(14 savings items; 15 prospective memory items; 17 episodic future thinking items; 17 planning items; 16 delay of gratification items). For each item, parents responded using a 6-point rating scale, where 1 indicated *strongly disagree* and 6 indicated *strongly agree*. Parents were also given three other response options, *don't know*, *does not apply*, and *prefer not to answer*. Additionally, approximately half of the items on the CFTQ were reversed items (See Appendix A for the CFTQ and Appendix B for the CFTQ item guide).

Study 1

Study 1 involved the development and distribution of the 79-item CFTQ to parents from the United States using the online platform, *Amazon's Mechanical Turk* (Mturk). The goals of this first study were to ensure that: (1) the questionnaire was appropriate and understood by parents before the distribution of the questionnaire to parents at two sites in North America in the second study, (2) parent ratings on the CFTQ were positively correlated with their child's age, and (3) there was some evidence of internal consistency within each subscale.

Method

Participants. Of the participants who completed the qualification survey ($N = 924$), less than half of those participants ($n = 383$) possessed the qualifications required for the CFTQ. Further, only 234 qualified participants proceeded to complete the CFTQ. From the 234 questionnaires, data from 156 participants met our pre-specified criteria. Fifteen participants were eliminated for having more than 20% missing data (i.e., truly missing or answering "don't know", "does not apply", or "prefer not to answer"). Thus, the final sample consisted of 141 participants— 23 parents had a 3-year-old child, 38 parents had a 4-year-old child, 37 parents had a 5-year-old child, 30 parents had a 6-year-old child, and 13 parents had a 7-year-old child. The majority of parents had a post-secondary education (87.2%) and were from middle-class

backgrounds (73.7% earning over $40,000 annually per household). Sixty-one percent were mothers and 39% were fathers.

Measures.

Future-oriented cognition. Children's future-oriented cognition was measured using the parent-report questionnaire, the CFTQ (see Appendix A). The CFTQ has five subscales that correspond to five future-oriented abilities: saving, prospective memory, episodic future thinking, planning, and delay of gratification. Parents indicated their agreement with 79 statements on a 6-point Likert scale (1: *strongly disagree*, 2: *disagree*, 3: *somewhat disagree*, 4: *somewhat agree*, 5: *agree*, 6: *strongly agree)*, or selected one of the additional response options ("don't know", "does not apply", "prefer not to answer"). The saving subscale consisted of 14 items and measured children's ability to save (e.g., money, material objects, time, physical space) for future use or consumption. It included items such as "My child saves an item to show someone at a later date (e.g., saves artwork to show a relative visiting later in the week)." The prospective memory subscale consisted of 15 items and measured children's ability to remember to carry out their future intentions. It included items such as "My child remembers what time he/she is supposed to be places (e.g., at 3 p.m. he/she is due at a friend's house)." The episodic future thinking subscale consisted of 17 items and measured children's ability to mentally project themselves into the future to think, imagine, or anticipate future states. It included items such as "My child thinks about what might be needed for future excursions (e.g., bringing toys/books on a long car ride)." The planning subscale consisted of 17 items and measured children's ability to construct plans and form goals for the future. It included items such as "My child sets goals and takes steps to achieve those goals (e.g., wishes to learn to swim and asks parent to enroll him/her in swimming lessons)." The final subscale, the delay of gratification subscale, consisted of 16

items and measured children's ability to postpone gratification in the present for greater future gains. It included items such as "My child forgoes a small treat in the present to receive a larger treat in the future (e.g., he/she would rather have two cookies after dinner versus one cookie before dinner)."

Procedure. Participants completed a pre-screening survey prior to completion of the CFTQ. The pre-screening survey ensured that potential CFTQ participants were parents of at least one 3-to-7-year-old child, who was typically developing and fluent in English, and were citizens of the United States. Only parents who met these criteria were invited to complete the CFTQ on MTurk. Invited participants who proceeded to complete the CFTQ, were first asked to provide consent and answer demographics questions pertaining to themselves and their child. Next, they completed the 79-item CFTQ questionnaire.

After the participants completed the questionnaire, a vigorous data cleaning process was performed to double-check that all participants who completed the questionnaire met the qualifications for the study. Additionally, participants who took less than 10 minutes to complete the study were eliminated, based on the average fastest possible completion times of three research assistants in our lab.

All procedures were approved by the Research Ethics Board at Brock University (Appendix C).

Results

Missing data consisted of "don't know", "does not apply", and "prefer not to answer" responses, as well as truly missing responses (i.e., blank responses). A negligible amount of missing data constituted truly missing responses (Eight parents from the final sample left between one and three responses blank). Across all subscales, twenty-one (14.9% of the final

sample) participants had more than 10% missing data. Missing data values for the 79 questionnaire items were replaced using Estimation Maximization, which is a method of maximum likelihood parameter estimation performed in SPSS. Estimation maximization yields a consistent set of imputed values and works well for large sample sizes and larger missing data percentages.

Table 1 shows descriptive statistics for the full CFTQ scale and each of the five subscales for each age group. The full scale score was calculated by taking the mean of all 79 items on the questionnaire and subscale scores were calculated by taking the mean of all items within a given subscale.

Table 1

Means and standard deviations for full scale and subscale scores across child age groups

	3-year-olds		4-year-olds		5-year-olds		6-year-olds		7-year-olds		All children	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Subscale												
Saving	3.71	.87	3.86	.78	3.94	.70	4.45	.44	4.06	.67	4.00	.74
Prospective memory	3.76	.96	4.04	.85	4.15	.74	4.54	.72	4.39	.87	4.16	.85
Episodic future thinking	3.78	.86	3.91	.77	3.94	.57	4.24	.46	4.25	.61	4.00	.68
Planning	3.66	.93	4.03	.77	4.05	.67	4.41	.51	4.13	.65	4.07	.74
Delay of gratification	3.57	.87	3.52	.68	3.55	.58	3.96	.49	3.64	.69	3.64	.67
Full scale	3.70	.83	3.87	.70	3.93	.55	4.31	.40	4.09	.51	3.97	.64

Full scale and subscale correlations with age. Table 2 shows correlations among children's age in months, full scale, and subscale CFTQ scores. Children's age in months was significantly positively correlated with saving, prospective memory, episodic future thinking, and planning subscale scores as well as the full scale score, *r*s (139) ranged from .25 to .30, *p*s < .01. However, there was no significant relation between children's age and the delay of gratification subscale score, r (139) = .14, p = .09, although the correlation was in the expected positive direction. Thus, higher parent-rated saving, prospective memory, episodic future thinking, and planning subscale scores were associated with increasing child age. Correlations among the future-oriented subscales were high (see Table 2 for Pearson correlation coefficients). Correlations between subscales remained significant after controlling for child's age in months.

Table 2

Correlations among child age, full scale, and subscale scores

Measure	1	2	3	4	5	6	7
1. Child age	—						
2. Saving subscale	.27**	—					
3. Prospective memory subscale	.30**	.73** (.71**)	—				
4. Episodic future thinking subscale	.25**	.77** (.75**)	.73** (.71**)	—			
5. Planning subscale	.25**	.81** (.79**)	.79** (.77**)	.76** (.74**)	—		
6. Delay of gratification subscale	.14	.70** (.69**)	.57** (.56**)	.62** (.61**)	.59** (.58**)	—	
7. Full scale	.28**	.91** (.92**)	.88** (.87**)	.89** (.88**)	.91** (.90**)	.78** (.78**)	—

Note. N=141 for all correlations. Partial correlations controlling for child's age in months are shown in parentheses. Age= child's age in months (calculated using child date of birth and date of test).

**$p<.01$.

Internal consistency. Table 3 shows the internal consistency reliabilities for each subscale and the full CFTQ scale. Cronbach's alphas were computed for each subscale and for the full scale. Overall, the saving (α = .83), prospective memory (α = .91), episodic future thinking (α = .85), planning (α = .88), and delay of gratification (α = .80) subscales all showed high internal consistency. The full scale also showed high internal consistency (α = .96).

Table 3

Cronbach's *alpha coefficients for full scale and subscale scores*

Subscale	N (items per subscale)	α
Saving	14	.83
Prospective memory	15	.91
Episodic future thinking	17	.85
Planning	17	.88
Delay of gratification	16	.80
Full Scale	79	.96

Note. N = 141.

Discussion

The initial distribution of the CFTQ to parents on MTurk yielded promising results and encouraged further distribution of the questionnaire to parents in Study 2. The newly developed questionnaire items seemed generally understandable to parents and developmentally appropriate for children 3-to-7-years old, given that few parents provided more than 20% missing data (i.e., 'don't know', 'does not apply' or 'prefer not to answer' responses).

All five CFTQ subscales showed positive correlations with age, and four of those correlations were statistically significant. The correlation between the delay of gratification subscale and child's age did not reach significance, but it was in a positive direction suggesting that the analysis might have lacked the power to detect a statistically significant relation. In

general, these results aligned with current research using behavioural tasks (e.g., Atance, & Jackson, 2009), which support age-related increases in future-oriented abilities in early childhood. Further, relations between subscales remained significantly positively related even after controlling for child's age in months. This provided confidence that the relation between domains of future-oriented cognition is not driven by maturational factors alone.

Additionally, initial results for the reliability of the CFTQ subscales were encouraging. All alpha coefficients were greater than .80, which indicated high internal consistency and suggested that items in the subscales and full scale were measuring similar constructs.

Thus, the results of Study 1 were encouraging for three reasons: (1) the items seemed understandable to parents and developmentally appropriate for children 3-to-7 years old, (2) the results provided confidence that the subscales were capturing age-related changes in future-oriented abilities, and (3) the results showed high internal consistency of all subscales.

Study 2A

Given the encouraging results of Study 1, the second study in this research project involved administering the CFTQ to a larger sample of parents who had children between the ages of 3 and 7 years old. One limitation of using MTurk to collect data is that there was no way to know for certain whether participants were truly parents, although evidence suggests MTurk participants are generally honest (Buhrmester, Kwang, & Gosling, 2011). Thus, the second study administered the CFTQ primarily in-person to a sample of parents from two locations: the Niagara region in Southern Ontario, Canada, and Greensboro, North Carolina, United States.

Study 2A involved the distribution of the CFTQ to parents in order to assess the reliability of the questionnaire. Overall, there were three main goals of Study 2A. The first goal of Study 2A was to ensure that the CFTQ subscales and the full scale correlated with children's

age. The second goal was to examine internal consistency reliability of the five subscales to ensure that each subscale is measuring the same construct (i.e., ensure that the items in each subscale are positively correlated with one another). For example, each item on the savings subscale should be positively correlated with all other items on the saving subscale if they are measuring the same ability. Finally, the third goal of Study 2A was to examine the internal structure of the measure and investigate whether the five subscales (saving, prospective memory, episodic future thinking, planning, and delay of gratification) are independent (i.e., are the five subscales tapping into five distinct components of future-oriented cognition?).

Method

Participants. Two hundred and fifty-three parents with children ranging from 28 to 103 months participated. Reports from 29 parents were excluded: 16 parents had substantial missing data (more than 25%) and 16 parents were excluded due to data entry error (n = 1), duplicate participation (n = 1), parent misunderstanding (n = 1), the child not being typically developing (n = 2), the child not being 3 to 7 years old (n = 3), or child birthdate errors (n = 8). The final sample consisted of 221 participants. Parents were recruited from community events, daycares, and an existing university database. There were 48 parents of 3-year-olds, 39 parents of 4-year-olds, 53 parents of 5-year-olds, 44 parents of 6-year-olds, and 37 parents of 7-year-olds. The majority of parents had a post-secondary education (86.1%) and were from middle-class backgrounds (78.8% earning an income over $40,000). Ninety percent were mothers and 10% were fathers.

Procedure. Parents provided consent and then completed demographics questions (see Appendix A) about themselves (i.e., parent education and annual household income) and their child (i.e., child age, health concerns, and ethnicity) followed by the 79-item CFTQ, which took

approximately 20 minutes to complete. For their convenience, parents were able to complete a paper-and-pencil or online version of the questionnaire. Questionnaire items were presented in the same fixed-order in both versions of the questionnaire.

Results

Missing data consisted of "don't know", "does not apply", and "prefer not to answer" responses, as well as truly missing data (i.e., blank responses). A negligible of missing data constituted truly missing responses (17 parents from the final sample left between one and nine response blank). Across all subscales, sixty (27.1% of the final sample) participants had more than 10% missing data. Missing data values in the scale were replaced using Estimation Maximization procedure.

Table 4 shows descriptive statistics for the full CFTQ scale and each of the five subscales for each age group. Full scale scores were calculated by taking the mean of all 79 items on the questionnaire and subscale scores were calculated by taking the mean of all items in a given subscale.

Table 4

Means and standard deviations for full scale and subscale scores across child age groups

	3-year-olds		4-year-olds		5-year-olds		6-year-olds		7-year-olds		All children	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Subscale												
Saving	3.83	.72	4.01	.56	4.20	.63	4.16	.56	4.47	.45	4.12	.63
Prospective memory	4.16	.77	4.28	.57	4.41	.78	4.40	.57	4.72	.81	4.38	.73
Episodic future thinking	3.90	.58	4.19	.47	4.21	.57	4.18	.55	4.39	.51	4.16	.56
Planning	3.93	.66	4.34	.52	4.37	.69	4.37	.69	4.60	.62	4.31	.68
Delay of gratification	3.76	.59	3.67	.58	3.85	.67	3.80	.65	4.13	.71	3.84	.67
Full scale	3.92	.59	4.10	.45	4.21	.58	4.18	.51	4.46	.51	4.16	.56

Full scale and subscale correlations with age. Table 5 shows correlations among children's age in months, subscale, and full scale CFTQ scores. Children's age in months was significantly positively correlated with saving, prospective memory, episodic future thinking, planning, and delay of gratification subscale scores as well as the full scale score, *r*s (219) ranged from .18 to .32, *p*s < .01. Thus, parent-rated saving, prospective memory, episodic future thinking, planning, and delay of gratification subscale scores were positively associated with children's age. Correlations among the future-oriented subscales were high (see Table 5). After controlling for child age, correlations between subscales remained significantly positively related.

Table 5

Correlations among child age, full scale, and subscale scores

Measure	1	2	3	4	5	6	7
1. Child age	—						
2. Saving subscale	.32**	—					
3. Prospective memory subscale	.24**	.68** (.65**)	—				
4. Episodic future thinking subscale	.25**	.71** (.69**)	.67** (.65**)	—			
5. Planning subscale	.30**	.76** (.73**)	.81** (.79**)	.72** (.70**)	—		
6. Delay of gratification subscale	.18**	.65** (.64**)	.52** (.50**)	.63** (.61**)	.56** (.54**)	—	
7. Full scale	.30**	.88** (.86**)	.86** (.86**)	.86** (.85**)	.90** (.89**)	.78** (.78**)	—

Note. N= 221 for all correlations. Partial correlations controlling for child's age in months are shown in parentheses. Age= child's age in months (calculated using child date of birth and date of test).

**p<.01.

Internal consistency. Table 6 shows the internal consistency reliabilities for each subscale and the full CFTQ scale. Cronbach's alphas were computed for each subscale and for the full scale. Overall, the CFTQ subscales showed high internal consistency (saving α = .80; prospective memory α = .89; episodic future thinking α = .80; planning α = .88; delay of gratification α = .81). The full scale also showed high internal consistency (α = .96).

Table 6

Cronbach's alpha coefficients for full scale and subscale scores

Subscale	N (item per subscale)	α
Saving	14	.80
Prospective memory	15	.89
Episodic future thinking	17	.80
Planning	17	.88
Delay of gratification	16	.81
Full Scale	79	.96

Note. N= 221.

Factor analysis. A principal axis factor analysis was performed to examine the initial internal structure of the 79 items on the CFTQ. The Kaiser-Meyer-Olkin measure of sampling adequacy for the factor analysis was revealed to be meritorious (Hutcheson & Sofroniou, 1999; KMO = .86). Initial Eigenvalues indicated that the first five factors accounted for 24.13%, 4.82%, 3.41%, 2.94%, and 2.49% of the variance respectively. One, two, and five factor solutions were examined using varimax rotation. The one-factor solution explained 23.40% of the variance, the two-factor solution explained 27.33% of the variance, and the five-factor solution explained 34.12% of the variance. However, the one-factor solution was preferred and more meaningful given: (1) theoretical understanding of future-oriented abilities sharing a core future-oriented component, (2) an insufficient number of loadings on the subsequent factors, (3)

difficulty interpreting these subsequent factors given loadings of items from multiple or all subscales, and (4) the appearance of the scree plot. Next, a confirmatory factor analysis was performed to examine one-factor and five-factor models (the five subscales represented the latent variables in the five-factor model). The goodness-of-fit indices were similar for both factor models. For the one-factor model, the comparative fit index (CFI) = .58, Tucker-Lewis fix index (TLI) = .58, and the RMSEA = .067. The Chi-squared test for the one-factor model was significant indicating inadequate model fit, χ^2 (3003) = 6153.32, $p < .001$. For the five-factor model, CFI = .66, TLI = .63, and RMSEA = .062. The Chi-squared test was also significant for the five-factor model indicating model misfit, χ^2 (2992) = 5660.08, $p < .001$. For both models, the RMSEA, CFI and TLI values were below the acceptable range (i.e., < .05 for RMSEA, ≥ .95 for CFI and TLI; Schreiber, Nora, Stage, Barlow, & King, 2006) and generally did not indicate good fit. Overall, a one-factor model was preferred. Thus, the five subscales of the CFTQ appear to converge on one single factor at this stage of questionnaire development and prior to item removal.

Discussion

In Study 2A, the CFTQ was distributed to parents in Canada and the United States to further assess the reliability of the questionnaire and to explore its factor structure.

The first goal of Study 2A was to examine the relation between age and the subscales and the relations among the subscales. As expected, positive correlations between age and the five subscales supported age-related increases in children's future-oriented abilities. Overall, it seems that parents are able to detect developmental increases in their children's future-oriented cognition. However, over and above developmental increases in ability, the domains of future-oriented cognition measured by the CFTQ remained highly correlated after controlling for

child's age. This suggests parents may be detecting individual differences in their child's future-oriented cognition, beyond those age-related increases. Thus, future-oriented cognition may be thought of as a broad term that encompasses multiple domains of related abilities.

The second goal of Study 2A was to examine internal consistency reliability of the five subscales. In line with Study 1, Study 2A revealed high internal consistency (αs = .80 or greater) for all subscales as well as the full scale. Thus, the CFTQ seems to be a reliable measure, where the subscales and full scale are capturing the same construct.

The third goal of Study 2A was to examine the internal structure of the scale and investigate the independence of the five subscales. An exploratory factor analysis supported one, large single factor accounting for about a quarter of the variance. Thus, it appears the five subscales converge on a single factor, which may reflect future-oriented cognition as one construct, rather than five distinct domains. In a similar scale construction procedure, Tahiroglu et al. (2014) also found evidence for one construct of children's theory of mind, despite the initial assumption of multiple distinct factors. Together, this suggests that measurement of children's social and cognitive abilities, such as theory of mind and future-oriented cognition, may be better conceptualized as one ability, rather than separable domains. Factor structure will continue to be examined during refinement of the CFTQ (i.e., the creation of a shorter version of the CFTQ not discussed in the current studies).

Thus, the results of Study 2 showed (1) age-related increases in children's future-oriented abilities as reported by their parents, (2) high internal consistency of all subscales consistent with the results of Study 1, and (3) evidence for a single factor of future-oriented cognition based on investigation of the scales internal structure.

Study 2B

Study 2B examined the validity of the CFTQ using a subset of parents from 2A who were invited to come into the laboratory with their 3-to-7-year-old child. In the laboratory, parents completed the CFTQ and their child completed a set of behavioural tasks. Each behavioural task measured one of the five domains (i.e., saving, prospective memory, episodic future thinking, planning, and delay of gratification) of future-oriented cognition that was assessed on the CFTQ. Study 2B had two goals: (1) to examine the relation between child age and behavioural task performance, and (2) to examine the relation between children's behavioural task performance and parent ratings on corresponding subscales.

Method

Participants. Eighty children (44 females, 36 males) and their parents (73 mothers, 7 fathers) participated in the study. The sample consisted of 17 three-year-olds (M = 41 months SD = 3.18), 15 four-year-olds (M = 55.13 months, SD = 3.64), 16 five-year-olds (M = 64.13 months, SD = 3.36) 16 six-year-olds (M = 77.50 months, SD = 3.52), and 16 seven-year-olds (M = 89.81 months, SD = 3.53). Children and their parents were recruited from a university participant database. The majority of children were Caucasian (82.5%) and from middle class backgrounds (80% earning an income over $40,000).

Measures.

Picture-Book task. The Picture-Book task (Atance & Meltzoff, 2005) was used to measure episodic future thinking. In this task, children were shown a picture of three locations: (1) a desert, (2) a snowy forest, and (3) a waterfall. For each location, children were asked to imagine going to the place in the future and then asked to choose one of three pictured items to bring to that place (e.g., for desert: soap, sunglasses, or seashell). After children had selected an

item, they were asked to provide a verbal explanation for their item choice. For each location, children received a score for selecting the correct item to bring with them (0 = *incorrect item choice*, or 1 = *correct item choice*) and a score of for providing a future-oriented explanation for their item choice (0 = *explanation not future-oriented*, or 1 = *explanation future-oriented*). Children were given a total score out of six, which combined item choice scores and explanation scores for the three locations. Two children were excluded from the final analysis due to uncooperativeness.

Truck Loading task. The Truck Loading task (Carlson et al., 2004) was used to measure planning. In this task, children were asked to help deliver party invitations to cardboard houses that lined a road made of black cardstock. Children were instructed to load coloured invitations into the back of a toy delivery truck and to follow several rules when delivering the invitations: (1) each invitation needed to be delivered to the matching coloured house, (2) they could only drive in one direction down the road, and (3) they had to deliver invitations from the top of the pile. After the experimenter demonstrated the rules and children indicated they understood, children began by delivering two invitations. At each level of difficulty (4 levels total), an additional house was added until children delivered five invitations. Children were given two trials for each level of difficulty to deliver the invitations and they were reminded of the violated rule after failing any given trial. Children had to successfully deliver the invitations on at least one of the two trials to move on to the next level. The game ended when the child failed two trials in a single level, or when the child delivered all five invitations. Children were scored out of four, based on the highest level achieved (4 = *successful delivery of all five invitations*).

Choice Delay. The Choice Delay (adapted from Prencipe & Zelazo, 2005) was used to measure delay of gratification. In this task, children were asked to choose between receiving one

sticker immediately and a larger quantity of stickers (two, four, six, or eight stickers) later at the end of the testing session. The experimenter demonstrated each choice. First, the experimenter demonstrated choosing a sticker for "now" and then demonstrated choosing a sticker for "later". Children were instructed to place their sticker on a small square of paper if they selected one sticker "now", or to place their stickers in a basket if they selected a larger quantity of stickers for "later". Children made four choices (1 vs. 2, 1 vs. 4, 1 vs. 6, and 1 vs. 8 stickers) and were scored based on how many times they chose to delay the reward (0 = *sticker now*, or 1 = *sticker later*), for a total score out of four. One child was excluded from the final analysis due to uncooperativeness.

Marble Game. The Marble Game (adapted from Metcalf & Atance, 2011) was used to measure saving behaviour. This task required children to decide whether they wanted to use marbles on a small, less exciting marble game immediately or save their marbles for a large, more exciting marble game later. Children were first taken to the laboratory's greeting room where they were introduced to a little marble game. The experimenter demonstrated how to use the little marble game and dropped a marble down the run. It was emphasized to the child that after a marble goes down the run and into the box it cannot be used again. Next, the child was taken into the main testing room where they were shown the bigger, more exciting marble game. Children were told that there were three different marble runs in this game, but just like in the other room, once a marble went down the run and into the box it could not be used again. The experimenter again demonstrated how to use the big marble game and explained that they only have three marbles left for the child to use for both rooms. The child was then asked how many marbles they had to use in the task to ensure they understood the rules. The experimenter corrected the child if they answered incorrectly. Children were then taken back to the greeting

room and told they would spend 1 minute in the greeting room playing with the little marble game. During this time the experimenter pretended to work at the desk and made neutral statements (e.g., “I have some work to do”) if the child attempted to interact with them. After 1 minute had passed, children were taken to the testing room to play with the big marble game. Children were supplied with additional marbles if they used them all in the first room. Children were given a score out of three based on how many marbles they saved for the second room with the more exciting marble game. Thus, higher scores on the big marble game indicate better saving. Four children were excluded from the final analysis due to changes to the initial task procedure.

Prospective Memory task. The Prospective Memory task, an adapted version of the card sort task (adapted from Mahy & Moses, 2011), was used to measure prospective memory. In this task, children were instructed to sort a stack of 40 cards into the appropriate coloured box and made a novel response when they encountered target cards. Children were first introduced a zookeeper who needed help putting the animals at the zoo into their cages. Children were instructed to place each animal into the coloured box that corresponded to the colour of a small sticker on each card (the ongoing task). Next, children were told that all the monkeys at the zoo escaped, so if they encountered a monkey in the stack of animal cards they should place the monkey cards in a box 1 metre behind them (prospective memory task). Children practiced the ongoing task by placing three animal cards in the appropriate coloured boxes to ensure they understood the rules. After the practice trials and one repetition of the rules, children drew pictures during a 3-minute delay period. Children then completed the card sort task. Three monkey pictures were presented in the 40-card stack in the 9th, 20th, and 35th positions. After children finished sorting the cards, they were asked a control question (“What were you

supposed to do when you saw a monkey?") to make sure they remembered what they were supposed to do in the game. If children failed this question, they were excluded from the analysis since it was not possible to determine if their errors were truly prospective in nature or retrospective (since they forgot what they had to do). Children were given a prospective memory score out of three based on how many monkey cards they placed in the box behind them. Seven children were excluded from the analysis for failing the control question or uncooperativeness.

Simon Says. Simon Says (adapted from Strommen, 1973) was used to measure inhibitory control. The experimenter introduced the rules of the game where children were instructed to follow the experimenter's commands, but only when the experimenter began the command with "Simon says". Otherwise, children were instructed to stay still. The experimenter practiced with the child and then proceeded to the test trials (five trials without and five trials with "Simon says"). The experimenter performed the commanded actions while saying the commands aloud to the child. Children were scored only on trials where Simon did not command an action, where scores were based on the amount of movement towards the commanded action (0 = *commanded movement*, 1 = *partial movement*, 2 = *different movement*, 3 = *no movement*). Children were given a total score out of 15, where higher scores indicated better inhibitory control. Five children were excluded from the final analysis due to uncooperativeness.

Peabody Picture Vocabulary Test- IV. The Peabody Picture Vocabulary Test (*PPVT-IV*; Dunn & Dunn, 2007) was used to measure children's receptive vocabulary. In this game, children were asked to select the picture that matched the word read aloud by the experimenter. First, children were given two practice trials where they were corrected if they pointed to the wrong picture. Children then began at the age appropriate set of words and continued until they answered incorrectly on eight or more words in a 12-word set. Children received a raw score,

which was calculated by subtracting the sum of their errors from the number of the last word in the final set of words reached. Five children were excluded from the analysis for uncooperativeness.

Procedure. Parents and children were tested in the laboratory at Brock University. Parents provided consent and filled out the CFTQ, which took approximately 20 minutes to complete, while the experimenter interacted with the child in the greeting room. Next, children were taken to a small testing room. After providing assent, children completed seven behavioural tasks in a fixed order: the Picture-Book task, Truck Loading task, Choice Delay Task, Prospective Memory task, Marble Game, Simon Says, and Peabody Picture Vocabulary Test (PPVT-IV). Five of the behavioural tasks corresponded to a future-oriented construct measured on the CFTQ, while the two additional tasks were used as control variables—a measure of receptive vocabulary (PPVT-IV) and a measure of executive function (Simon Says). The entire session took approximately one hour.

Results

Missing data consisted of "don't know", "does not apply", "prefer not to answer" responses, as well as truly missing data (i.e., blank responses). A negligible of missing data constituted truly missing responses (Four parents from the final sample left between one and nine response blank). Across all subscales, twenty-seven (33.8% of the final sample) participants had more than 10% missing data. Missing questionnaire data was replaced using Estimation Maximization.

Table 7 shows descriptive statistics for the behavioural tasks for each child age group.

Table 7

Descriptive statistics for behavioural tasks across child age groups

Behavioural Task	3-year-olds			4-year-olds			5-year-olds			6-year-olds			7-year-olds			All children		
	N	*M*	*SD*	N	*M*	*SD*	N	*M*	*SD*	N	*M*	*SD*	N	*M*	*SD*	N	*M*	*SD*
Marble Game	15	.47	.83	15	1.00	1.07	16	1.00	.97	16	1.25	.93	14	.86	.77	76	.92	.93
PM	12	1.00	1.04	14	1.57	1.28	16	1.81	.91	15	2.33	.98	16	2.13	1.09	73	1.81	1.13
Picture-Book	15	4.27	1.87	15	5.27	1.03	16	5.56	.96	16	5.88	.50	16	6.00	.00	78	5.41	1.20
Truck loading	17	1.06	.97	15	1.40	1.55	16	2.69	1.66	16	3.63	.89	16	3.81	.75	80	2.51	1.64
Choice Delay	16	2.44	1.59	15	2.33	1.68	16	2.56	1.63	16	2.50	1.32	16	3.25	.93	79	2.62	1.45
Simon Says	14	.36	1.34	14	2.29	4.46	15	9.73	6.08	16	12.06	3.79	16	12.88	2.89	75	7.76	6.47
PPVT-IV	16	61.13	14.02	14	94.36	14.79	15	107.40	10.73	15	128.33	15.77	15	140.27	15.07	75	105.85	31.47

Note. PM= prospective memory task.

Correlations between children's age and behavioural task performance. Table 8 shows Pearson correlation coefficients with behavioural tasks and children's age in months. Children's age in months was significantly positively correlated with performance on the Prospective Memory task, Picture-Book task, Truck Loading task, as well as our two control tasks, Simon says and the PPVT-IV (*r*s ranged from .40 to .90, *p*s < .01). Child's age in months was marginally significantly associated with their performance on the Marble game, r (74) = .21, p = .08. Further, child's age in months was not significantly associated with their performance on the Choice Delay task, r (77) = .17, p = .14. Thus, older children performed better on tasks measuring prospective memory, episodic future thinking, planning, executive function, and receptive vocabulary.

Correlations between behavioural task and subscale ratings. Table 8 shows Pearson correlation coefficients with behavioural tasks and subscales as well as the full CFTQ scale. The Picture-Book task was positively associated with the episodic future thinking subscale, r (73) = .32, p = .01, and the Truck Loading task was significantly associated with the planning subscale, r (74) = .24, p = .04. Children's performance on the other behavioural tasks (Prospective Memory task, Marble game, and Choice Delay) was not associated with parent ratings on the relevant CFTQ subscales, though all were in the expected positive direction. Thus, only children's performance on two behavioural tasks was significantly associated with their parent's ratings of their ability on the corresponding subscale. After controlling for child age, the relation between the Truck Loading task and the planning subscale was no longer significant (see Table 8 for age-partialled correlations). The relation between the two behavioural tasks and the corresponding subscales was no longer significant after controlling for receptive vocabulary and inhibitory control. Next, I examined whether children's behavioural performance was related to

the full CFTQ scale. Only the Picture-Book task, r (73) = .23, p = .05, and the Choice Delay task, r (74) = .24, p = .04, were significantly associated with the full CFTQ scale. However, these relations were not significant after controlling for child's age in months.

Table 8

Correlations among age, behavioural tasks, subscales, and the full scale

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	—													
2. Marble Game	.21	—												
3. PM	.40**	.22 (.17)	—											
4. Picture-Book	.52**	.15 (.05)	.04 (-.13)	—										
5. Truck Loading	.69**	.18 (.06)	.18 (-.12)	.46**(.17)	—									
6. Choice Delay	.17	.05 (.04)	-.04 (-.13)	.11 (.04)	.14 (.02)	—								
7. Simon Says	.74**	.23 (.14)	.22 (-.10)	.49**(.18)	.67**(.35**)	.11 (-.04)	—							
8. PPVT-IV	.90**	.23 (.10)	.44**(.00)	.57**(.26*)	.63**(.01)	.07 (-.12)	.70**(.13)	—						
9. Saving subscale	.22	.12 (.09)	.03 (-.10)	.21 (.12)	.11 (-.05)	.24*(.20)	.26* (.16)	.26* (.10)	—					
10. PM subscale	.05	.24*(.25*)	.07 (.06)	.05 (.03)	.06 (.04)	.21 (.21)	.17 (.25*)	.05 (.11)	.59**(.60**)	—				
11. EFT subscale	.24*	.11 (.08)	-.02 (-.12)	.32**(.25*)	.18 (.02)	.20 (.15)	.29* (.20)	.32**(.21)	.71**(.69**)	.53**(.53**)	—			
12. PL subscale	.25*	.24*(.21)	.24* (.16)	.23* (.13)	.24* (.09)	.16 (.11)	.29* (.18)	.30* (.16)	.75**(.73**)	.75**(.77**)	.65**(.62**)	—		
13. DoG subscale	.18	-.03 (-.05)	-.05 (-.15)	.17 (.10)	.12 (-.02)	.18 (.15)	.14 (.02)	.26* (.20)	.67**(.66**)	.47**(.47**)	.66**(.65**)	.52**(.50**)	—	
14. Full scale	.22	.16 (.14)	.06 (-.04)	.23* (.15)	.17 (.02)	.24*(.20)	.27* (.19)	.28* (.19)	.88**(.87**)	.80**(.81**)	.84**(.83**)	.87**(.86**)	.80**(.80**)	—

Note. Partial correlations controlling for age are shown in parentheses. Age= child's age in months (calculated using child date of birth and date of test). The *n*s ranged from 70-80 subjects. PM= prospective memory; EFT= episodic future thinking; PL=Planning; DoG= delay of gratification.

*p<.05. **p<.01.

Discussion

The overarching goal of Study 2B was to examine the validity of the CFTQ using a subset of parents from Study 2A who were invited to come into the laboratory with their 3-to-7-year-old child.

The first goal was to examine correlations between child age and behavioural tasks. Three of the five tasks measuring future-oriented abilities, as well as our two control tasks, were positively associated with age. Importantly, this is in line with the conclusions of Study 1 and Study 2A and the larger literature, that shows developmental increases in children's future-oriented abilities increase between 3 and 7 years old (e.g., Suddendorf et al., 2011, Mahy et al., 2014; Atance, Metcalf, & Thiessen, 2017; Tecwyn, Thorpe, & Chappell, 2014). However, the behavioural measure of savings (Marble game) and delay of gratification (Choice Delay) were not significantly associated with age. Thus, these two behavioural tasks did not capture age-related increases in the development of future-oriented abilities. This was surprising given that previous literature has shown that saving behaviour and delay of gratification increase between children 3-to-5 years old (Atance et al., 2017; Metcalf & Atance, 2011; Prencipe & Zelazo, 2005). One possible reason for the lack of significant correlation between age and savings behaviour could be a result of our adaptation to the Marble Game procedure. In our procedure, children only waited 1 minute in the first room, with the little marble game, before proceeding to the next room with the big marble game. In contrast, in the original procedure, children waited for 3 minutes in the first room (Metcalf & Atance, 2011). Younger children might not have performed as poorly on our version of the Marble Game because the incentive or future reward was relatively immediate. In other words, younger children may have been able to save more marbles for the second room because the delay period was not long enough to elicit "spending".

Therefore, a 1-minute delay may not have been enough time to detect differences in saving between older and younger children. Alternatively, providing children with only three marbles may have limited the variability in saving across ages and therefore made it difficult to detect differences across age (Metcalf & Atance, 2011). Future research is needed to examine the developmental trajectory of savings in order to determine how and when savings in children develops. Currently, few studies have examined savings in young children, and mixed results have been found in terms of age-related development (Metcalf & Atance, 2011; Atance et al., 2017). In regard to the lack of significant correlation between the delay of gratification and age, the Choice Delay task in the current study involved stickers as a reward, which may have been less motivating than other types of rewards (e.g., candies, pennies; Prencipe & Zelazo, 2005). Alternately, the Marble Game and the Choice Delay task may evaluate children's time preference (i.e., preferences surrounding now or later) to a greater extent than their cognitive abilities. Tasks evaluating children's decisions surrounding preference may relate to 3-to-7-year-old children's developmental growth less strongly than other, more cognitively based (i.e., tasks evaluating children's correct vs. incorrect responses) behavioural tasks. This may explain why children's performance was not related to age on delay of gratification and savings tasks. Another possibility is that more power is needed to detect the age-related differences in savings and delay of gratification since the relation with age was in the expected positive direction but failed to reach significance.

The second and main goal of Study 2B was to determine the validity of the CFTQ by comparing children's behavioural task performance to parent's ratings on the subscales and the full scale of the CFTQ. Children's performance on two behavioural tasks was significantly associated with their parent's ratings on the corresponding subscale; the Picture-Book task was

positively related to the episodic future thinking subscale and the Truck Loading task was positively related to the planning subscale. However, these relations generally became non-significant after controlling for child's age, as well as receptive vocabulary and inhibitory control— a finding consistent with past research on children's future-oriented cognition (e.g., Carlson et al., 2014, Atance and Jackson, 2009; Hanson et al., 2014). It is surprising, however, that the Marble Game, the Prospective Memory task, and the Choice Delay were not related to their corresponding CFTQ subscale although all were in a positive direction. There are several possible explanations for this lack of relation.

The first possibility is that parents are simply not able to accurately assess their children's future-oriented abilities in these domains, which could be due to parents' lack of attention to their children's abilities in the areas of saving, prospective memory, and delay of gratification. Alternatively, parents may not be able to accurately assess children's future-oriented abilities due to their lack of insight or understanding about their child's abilities in these often introspective and abstract domains.

Another possible explanation is that the tasks that were used to measure saving, prospective memory, and delay of gratification were not capturing the construct of future thinking in the same way as the CFTQ. First, behavioural tasks, like those used in Study 2B, may involve multiple cognitive abilities (e.g., working memory in children's prospective memory; Mahy & Moses, 2011) beyond the ability to think about the future, which may account for the lack of significant relation between task and the corresponding subscale. Nevertheless, this explanation seems unlikely given that these tasks have been extensively used in past research (e.g., Atance et al., 2017; Mahy et al., 2014; Prencipe & Zelazo, 2005) as measures of children's future-oriented cognition. Second, the CFTQ may capture children's future-oriented abilities

differently than behavioural tasks given that parents may evaluate their child's ability on the CFTQ relative to other same-aged children, while behavioural tasks evaluate children's absolute performance. Weaker correlations between child's age and subscales, compared to age and behavioural tasks, further supports this possibility. However, at this early stage of questionnaire development, I propose the most likely explanation for the lack of correlation between behavioural tasks and the corresponding CFTQ subscale is the need for item deletion.

One main goal of this research moving forward (but not discussed here) is the creation of a shorter version of the CFTQ (i.e., approximately 40 items), with about half of the current items removed. That is, based on the collected data, I plan to delete weak items from the subscales such that the remaining questionnaire items best capture the constructs I aimed to measure. Items will be considered for deletion if they have more than 20% missing data, show poor internal consistency with their subscale, or fail to correlate with children's behavioural performance in a given domain. However, given the small sample size in Study 2B and the possibility that behavioural tasks themselves may not be a true measure of the intended ability, items that fail to correlate with children's behavioural performance will be weighted less heavily and carefully considered during item removal. Overall, I expect that the elimination of weak items will strengthen the validity of the questionnaire and may strengthen the relation between the subscales and behavioural tasks, which failed to correlate in the current study.

In general, Study 2B provided some evidence that the behavioural measures of future-oriented thinking detected age-related increases, with the exception of saving and delay of gratification tasks. Further, parent's ratings of children's abilities on the CFTQ were related to children's performance on two of the five behavioral tasks, thus providing some evidence of validity. Nevertheless, I am confident there will be improvements to the relations between

behavioural tasks and the corresponding subscales, and thus the validity of the questionnaire, after item deletion.

General Discussion

The goal of the current study was to examine the reliability and validity of a newly developed parent-report measure of children's future-oriented cognition in a field that previously relied heavily on behavioural tasks. Moreover, this study sought to overcome some of the issues that accompany behavioural methods, such as low ecological validity, lack of coherence, and high verbal demands. Study 1 and 2A provide support for the initial reliability of the measure and Study 2B provided some evidence for the validity of the CFTQ.

In Study 1, the CFTQ was distributed to parents on *Amazon's Mechanical Turk* and provided initial evidence for the reliability of the measure. Items in each subscale were positively associated with other items in the subscale. Further, children's future-oriented cognition, as rated by their parents, showed improvements as children aged suggesting that parents were detecting age-related increases in future-oriented abilities.

Study 2A similarly confirmed high internal consistency reliability of the CFTQ and also provided further support for children's age-related increases in future-oriented abilities. Further, a factor analysis supported future-oriented cognition as a single factor, rather than five separable domains corresponding to the questionnaire's five subscales.

In Study 2B, parent ratings on the CFTQ were compared to their child's performance on behavioural tasks tapping the same abilities measured on the five subscales. Study 2B provided some evidence for the validity of the measure and also showed age-related increases in future-oriented abilities, on some subscales and behavioural tasks.

The Development of Future-Oriented Cognition

In general, these studies provided support for age-related increases in future-oriented cognition in children 3-to-7 years old both from parent-report and behaviourally. Importantly, the current study supported age-related increases in future-oriented abilities as measured by most behavioural tasks (Prospective Memory task, Picture-Book, and Truck Loading), as well as the five CFTQ subscales. This is in alignment with previous findings in the literature that suggest children begin to develop future-oriented abilities around 3 years old and continue to hone these skills into middle childhood and even adolescence (e.g., Atance & O'Neill, 2005; Kliegel & Jäger, 2007; Friedman, 2000; Zimmermann & Meier, 2006). However, age-related increases were not supported for the Marble Game and the Choice Delay tasks, though both were in the positive direction. This could be a result of low power, or the tasks themselves not detecting variability in performance across 3-to-7-year-old children. Interestingly, the delay of gratification subscale was also weakly associated with age in comparison to the other subscales, across all studies. Thus, the delay of gratification task and subscale may relate differently to age than other subscales given the underlying processes involved. For example, research supports delay of gratification as a "hot system" of cognition, which is driven by emotion and impulse, rather than reflective thought (Metcalfe & Mischel, 1999). For this reason, age-related changes in decisions of "now versus later" may not be as apparent in 3-to-7-year-old children, since the hot-system of that governs delay decisions dominates throughout early childhood (Metcalfe & Mischel, 1999). In contrast, other domains of future-oriented cognition (e.g., planning, prospective memory etc.) that relate more strongly to age, focus on reflective thought and cognitive knowledge, which may not evoke impulsive decision making in the same way as the delay of gratification domain. Nevertheless, in general, the current studies demonstrated a similar developmental pattern across

five domains of future-oriented cognition as measured by the CFTQ. Thus, the CFTQ seems to be capturing developmental patterns in future-oriented abilities that are similarly found in the literature using behavioural tasks.

The Reliability of the Children's Future Thinking Questionnaire

Across all studies, the CTFQ demonstrated high internal consistency on all five subscales. This initial evidence of reliability is important for establishing the CFTQ as a scale with good psychometric properties. Further, I expect to maximize internal consistency with item removal, which will provide additional confidence in the reliability of the measure. Thus, the CFTQ makes an important contribution to the field as a reliable parent-report measure of children's future-oriented cognition. Further, the single factor structure of the scale suggests these domains of future thinking may represent one core ability.

Addressing the Limitations of Behavioural Tasks

Broadly, the primary objective of the creation of the CFTQ was to overcome some of the limitations that accompany behavioural methods of assessing future-oriented cognition in children. Given the heavy reliance on behavioural measures in the literature, it was important to construct an alternative measure of future-oriented cognition to address these limitations.

The first prominent issue that the current study aimed to address is the lack of coherence among behavioural tasks measuring children's future-oriented cognition. Atance and Jackson (2009) found that after controlling for age, behavioural tasks measuring domains of future-oriented cognition were no longer correlated with one another (Atance & Jackson, 2009). This is problematic because it suggests that future-oriented tasks may not share a common future-oriented component, beyond that related to development. However, the current study suggests children's future-oriented abilities, as rated by their parents, may represent aspects of one core

ability as opposed to five distinct domains. These findings suggest a discrepancy between the measurement of these abilities using behavioural tasks and measurement using parent-report. Atance and Jackson (2009) suggest that although these abilities involve future-orientation, completion of the behavioural tasks may rely more heavily on distinct cognitive components (e.g., working memory or inhibitory control). Therefore, one possible explanation for the difference in results between behavioural and parent-report methods is that parents are not able to differentiate these abilities in the same way as behavioural tasks. Parents might not be able to assess different levels of working memory demand imposed by planning, prospective memory, or savings, whereas the behavioural tasks used to measure these abilities might detect differences in these cognitive demands. Alternatively, as these studies' results suggested, future-oriented cognition may best represent one domain with a common future thinking component, rather than a number of separable domains. Thus, the current study does not provide greater clarity on the lack of coherence among behavioural tasks, but presents an issue to examine more extensively in future research.

The second issue with behavioural tasks is that they often include a verbal explanation or descriptive component, which may place a high demand on children's verbal abilities. For example, the Picture-Book task asks children to reason why they would take a certain item to a place in the future and the Tomorrow task asks children to report what they will do tomorrow (Busby & Suddendorf, 2005; Atance & Meltzoff, 2005). The CFTQ successfully addressed and avoided the issue of young children's linguistic incompetence by having parents report on their children's abilities. Though this issue may be partially addressed in behavioural tasks by controlling for verbal ability, young children may still have difficulty communicating their conceptualization of the future and thus, perform poorly on tasks with high verbal demands

(Suddendorf & Busby, 2005). Further, children's linguistic ability to comprehend past and future tenses develop gradually between the ages of 3 and 7 years old and can, therefore, affect children's performance (Harner, 1980). For this reason, controlling for receptive vocabulary in behavioural tasks may not be sufficient. Therefore, the CFTQ overcomes this issue by measuring children's future-oriented cognition using parent reports, which does not rely on children's verbal abilities.

The third issue that the CFTQ sought to address was the lack of ecological validity in behavioural laboratory tasks. Since laboratories are often artificial contexts and measures of performance are confined to one task often on a single visit, important aspects of future-oriented cognition may be missed in laboratory tasks. However, the CFTQ items were created so parents could report on their children's future-oriented cognition across several contexts in their daily life. For example, items such as "Plans what may be required for school/daycare that week (e.g., he/she plans what show and tell item to bring for show and tell)" and "Wants to open all his/her presents immediately rather than waiting for the appropriate day (e.g., birthday, Christmas, Hanukkah, etc.)" required parents to imagine their children in daily life in different contexts. Further, parents could evaluate their child's abilities across many days in their life, in contrast to evaluations of their abilities captured by behavioural measures, which rely on one single performance. With 79 items, the CFTQ captured a broad range of future-oriented contexts. Moving forward, during item removal I will retain items that refine the validity of the measure, while still capturing a breadth of contexts to support a more ecologically valid measure than behavioural methods.

Fourth, the CFTQ offers the potential to overcome the lack of representativeness and inefficiency of behavioural measures carried out in the laboratory. In terms of efficiency, the 79-

item questionnaire took parents approximately 20 minutes to complete. In contrast, it took children approximately 45 minutes to complete the battery of behavioural tasks. Moreover, the CFTQ had the versatility of being distributed to a large number of parents in the lab, daycares, and the community and could be completed at their convenience (and even online), whereas behavioural tasks were restricted to completion in-lab with a smaller number of children. Once a shorter version (approximately 40 items) of the CFTQ is established completion time could be reduced to as little as 10 minutes. Thus, overall, the CFTQ seems quite efficient, in contrast to behavioural methods.

Importantly, in terms of representativeness, in Study 1 and Study 2A the CFTQ was distributed to parents in the United States. For example, in Study 1, the questionnaire was distributed to participants from across the United States using Mturk. Thus, the questionnaire is advantaged in its ability to reach participants from more diverse economic, social, and ethnic backgrounds due to the ease of online or in-person administration that does not require travel. In contrast, Study 2B was restricted to Canadian participants in the surrounding area of the laboratory. Thus, the CFTQ shows promise in overcoming the lack of representativeness associated with behavioural methods.

The final issue with relying solely on behavioural tasks is that these tasks lack the important perspective of the parent. The current study addressed this issue by having parents report on their children's future-oriented abilities using the CFTQ. In general, parents seem to be able to accurately report on their children's future-oriented cognition, since the planning and episodic future thinking subscales showed evidence of validity, and the correlations between the other subscales and corresponding tasks were in the expected direction. However, though the CFTQ certainly captures the parent perspective, from the results of this study it is uncertain

whether parents have accurate perceptions of their children's future-oriented abilities across all domains. One possible explanation for the lack of relation between subscales and corresponding behavioural tasks was that parents might not be very good at reporting on their child's abilities because they are not aware of how their child thinks or behaves in situations that require reasoning about the future. If this is the case, it is important to consider why parents are not accurately able to report on children's future-oriented cognition, but can accurately report on their child's cognitive abilities in other areas, such as theory of mind (e.g., Tahiroglu et al., 2014).

In a study examining children's understanding of their own and others' future preferences, Bélanger et al. (2014) provided a possible explanation. They suggested shifts to future perspectives may be difficult for young children because it requires reasoning about an event that has yet, or may not occur, and for this reason, future perspectives may not be discussed with parents as regularly as past perspectives (Bélanger et al., 2014). Thus, it may be the case that parents are not able to accurately report on their children's future-oriented cognition because these future perspectives are not often discussed. This may also explain why parent-report measures examining other child cognitive abilities such as theory of mind (Tahiroglu et al., 2014) provide good evidence of validity.

However, it may also be the case that children's abilities, as measured by one behavioural task, one day in the lab is not indicative of their day-to-day performance across varied contexts. Consequently, a parent's perspective is still valuable, especially when trying to measure very young children's abilities across a variety of contexts (e.g., home, school, extracurricular activities). Thus, the incorporation of the parent perspective using the CFTQ is still important for a more complete understanding of complex child behaviours, such as future-oriented cognition.

The overarching goal of this research project was to provide an alternative method to assess children's future-oriented cognition, which addressed the problems associated with behavioural measures such as lack of coherence, high-verbal demands, lack of ecological validity and representativeness, as well as the lack of parental insight. Though the current study cannot address these limitations entirely, future refinement of the CFTQ will help to provide clarity on the degree to which the parent-report measure can overcome the limitations of behavioural tasks. Next, the procedure of further refining the CFTQ and its implications for scale reliability and validity is discussed.

Future Directions

The current study was the first step in the creation of a reliable and valid measure of children's future-oriented cognition. The next steps in this project are to further examine the reliability and validity of the CFTQ by examining individual items and eliminating items based on a careful evaluation of the following criteria: (1) questionnaire items with more than 20% missing data (i.e., combined *don't know*, *does not apply* or *prefer not to answer* responses) will be removed, (2) items with low item-total correlations (< .20) with their subscale will be deleted, and (3) appropriate coverage from the five subscales and correlations with behavioural tasks will be considered when selecting items for the final, shorter version of the scale.

Evaluating each item on the CFTQ based on the above criteria will ensure items on the questionnaire are capturing the meaning of future-oriented cognition globally as well as the meaning of the five individual domains. Specifically, the first criterion will ensure that I am eliminating items where many parents answered *don't know* or *does not apply,* since these items are likely not understood by parents, or parents are not aware of how their child thinks or

behaves in the proposed situation. Thus, selecting items that parents are generally able to answer will better reflect parents' true capabilities of assessing their children's future-oriented abilities.

However, even items that parents have no difficulty answering may fail to correlate (or correlate negatively) with other items in the same subscale. For this reason, I will also remove items based on low item-total correlations, which will help to increase internal reliability in each subscale and subsequently of the overall scale.

Finally, our third criterion for item removal will consider how each item relates to children's behavioural performance on corresponding tasks. Because behavioural tasks are the primary method of assessing children's future-oriented abilities across the literature, examining correlations between subscales and corresponding behavioural tasks is important for providing evidence of validity. However, removing items based on this criteria will be evaluated with caution given the small sample size of Study 2B and the limitations that accompany behavioural tasks themselves. For example, future-oriented cognition tasks may capture behavioural tendencies or other cognitive skills (e.g., executive functioning) alongside future-oriented abilities and are therefore not measuring only the future-oriented ability of interest. Though results from Study 2B showed some evidence of validity, considering the removal of questionnaire items that correlate weakly (or negatively) with the corresponding behavioural task may provide greater confidence that the CFTQ is capturing the construct of future-oriented cognition as presented in the field. Importantly, items will not be eliminated simply because they do not correlate with the corresponding behavioural task, however, criterion three may be helpful in determining between two items that are similar in terms of percentage of missing data and item-total correlations. For example, several savings item may relate similarly to their subscale and in the amount of missing data, but one may not relate as strongly to the behavioural task.

Therefore, criteria three will be important for determining which items best correspond to the subscale, as measured using behavioural tasks and as described in the literature. Item coverage will also be considered along with item correlations with behavioural measures to ensure that each scale is capturing each construct well.

After item deletion, a shorter version of the CFTQ with approximately 40 items will be formed. Given that the items should best capture the five domains of future-oriented cognition, I expect the resulting questionnaire to possess similar internal consistency reliability and higher validity (stronger correlations between subscales and the corresponding behavioural tasks).

Once a shorter version of the current questionnaire is formed, it will be important to validate the scale with a new sample of parents and children. This third, cross-validation study will rule out the possibility that correlations in the current study were due to chance and provide a second test of validity. Following a similar procedure as Study 2B, 80 parents will be asked to complete the questionnaire and their children will complete a new set of behavioural tasks tapping the five domains measured on the CFTQ, as well as other domains of cognitive functioning. Therefore, the goal of Study 3 is to provide confidence that the relation between CFTQ subscale and the corresponding behavioural task is independent of other important aspects of cognitive functioning, such as executive functioning and verbal ability. Overall, Study 3 will be an important next step in further establishing the validity of the CFTQ. Given that some of the tasks used in the current study did not correlate with the corresponding subscale, it is important to use different tasks to further investigate the lack of coherence between behavioural tasks and CFTQ subscales.

Another future direction of this research project is to examine two other forms of reliability, test-retest and interrater reliability. To assess inter-rater reliability, a new sample of

mothers and fathers will complete the CFTQ about their same child separately. Test-retest will be examined by having another new sample of parents complete the CFTQ at two points in time (between one and four weeks apart). These additional measures of reliability will provide preliminary insight into the stability of parents' ratings across time and also the consistency in responses between caregiver pairs.

Once established, it is intended that the CFTQ is made freely available to other researchers and can be included as an additional source of data to complement the currently available behavioural measures. There are many directions this future research could take. For example, future work is necessary to determine how well the CFTQ captures future-oriented cognition in atypical or culturally diverse samples. Though the current study aimed to capture a diverse sample of parents, future research could examine the applicability of the CFTQ for more economically and culturally diverse populations within or outside of North America. In addition, the CFTQ offers insight surrounding parent perceptions of children's future-oriented abilities. This is incredibly valuable for better understanding how future-oriented cognition is fostered in the parent-child relationship and also how important parents see these abilities in terms of their child's development. For example, Atance et al. (2017) suggest children's ability to save may be determined in part by the importance parents place on saving and the experience parents provide their children with regards to saving in the environment. The CFTQ could, therefore, be used alongside measures of parenting practices to explore how parents may elicit or impede their children's development of future-oriented abilities. Further, the CFTQ could provide insight into parental expectations of their children, in terms of their future-oriented responsibilities. It would be interesting to explore at what age parents rely on their children to complete certain future-oriented tasks, such as using an agenda to plan weekly events or remembering to take a

permission slip back to school without reminders. Items on the CFTQ that parents indicate "does not apply" to their child could be used to explore this question. Importantly, parents' perceptions of their child's future-oriented cognition have not been explored in detail as no parent-report measure previously existed to capture the parent perceptive.

Conclusion

Taken together, these studies suggest that parents provide important insight into their children's future-oriented cognition. Parent reports are important for capturing a complete understanding of children's future-oriented development, in varied contexts, which is missed when behavioural measures are used on their own. With further refinement, it seems promising that the CFTQ will be a reliable and valid measure of children's future-oriented cognition—one that can capture individual differences in child development. The CFTQ will be a useful tool for answering new research questions in the burgeoning field of children's future-oriented cognition and will complement currently available behavioural measures.

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Appendix A: The Children's Future Thinking Questionnaire

Children's Thinking Questionnaire

Today's Date: _____ **Sex of Child: M F (circle one)**
Day Month Year

Child's Date of Birth: _____ **Age of Child: ____ (Years) __ (Months)**
Day Month Year

Does your child have any major health problems? No Yes (circle one)

If yes, please explain briefly: _____

Your relationship to Child:
Mother _____ Father _____ Other (please indicate relationship): _____

Your education level (please check highest level attained):
___ No formal education
___ Grade school
___ Some high school
____ High school
___ Some college or 2-year degree
___ Bachelor's degree (Major: _____)
___ Graduate degree (Please specify)_____
___ Other (Please specify)_____
____Prefer not to answer

Which category best describes your total family annual income?
___ less than $25,000
___ $25,000-$40,000
___ $40,000-$75,000
___ $75,000-$100,000
___more than $100,000
___prefer not to answer

Your child's cultural background/ Race-Ethnicity (please check all that apply):
___ White
___ Black or African American
___ Hispanic, Latino, or Spanish
___ Asian
___ Asian Indian
___ Hawaiian Native
___ Pacific Islander
___ Middle Eastern
___ Alaskan Native
___ First Nations, Inuit, or Metis
___ Other group (Please specify):_____

Thank you! Please continue to the next page for the questionnaire. →

On the following pages you will see statements that describe children's everyday thinking and behaviours. We would like you to tell us how well each statement describes your child. If you have more than one child between the ages of 3 to 7 years old, please answer the following questions for only one child (the same child for whom you answered the previous demographic questions). For each statement, consider how your child completes each task or activity independently. There are no right or wrong answers.

Please read each statement carefully and answer the following questions about **your child** by circling a number from 1 (strongly disagree) to 6 (strongly agree):

Circle #	If the statement is:
1	**Strongly Disagree**
2	**Disagree**
3	**Somewhat Disagree**
4	**Somewhat Agree**
5	**Agree**
6	**Strongly Agree**

Please do your best to respond to all of the items. However, if you cannot answer an item because you have no idea whether your child thinks or behaves in that way, then circle "Don't Know" (DK). If the statement does not apply to your child, please circle "Does not apply".

If you feel uncomfortable answering an item, then circle "Prefer Not to Answer" (PNTA).

Please be sure to respond by circling **a number, "Don't Know"**, or **"Prefer Not to Answer"** for **every** item.

Thank you for helping us learn more about children's thinking!

EXAMPLE:

	My Child…	**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**	**Don't Know**	**Does Not Apply**	**Prefer Not To Answer**
1	Likes to watch T.V.	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
1	Will not eat healthy foods at dinner even if he/she won't get dessert as a consequence.	1	2	3	4	5	6	DK	DNA	PNTA
2	Performs chores or tasks in advance of a desirable outing (e.g., cleans room before dinner so he/she can attend sibling's soccer game after dinner).	1	2	3	4	5	6	DK	DNA	PNTA
3	Forgets to inform parents or teachers of his/her whereabouts (e.g., goes to the bathroom without telling the teacher).	1	2	3	4	5	6	DK	DNA	PNTA
4	Does not consider how long it will take to save up for a desired item (e.g., does not consider how many stickers he/she must earn to get a prize).	1	2	3	4	5	6	DK	DNA	PNTA
5	Makes a plan before tackling a difficult task (e.g., lays out all pieces of an item before assembling).	1	2	3	4	5	6	DK	DNA	PNTA
6	Fails to understand that current and future desires can differ (e.g., when he/she wakes up in the morning full of energy, he/she may not think he/she will be tired at night time).	1	2	3	4	5	6	DK	DNA	PNTA
7	Understands that a currently irrelevant object might be useful in the future (e.g., realizes a key might be used to open something).	1	2	3	4	5	6	DK	DNA	PNTA
8	Tries to find ways to decrease the amount of time it takes to complete a task (e.g., uses the fastest route to a friend's house when he/she is running late, or uses a box to collect items more quickly when cleaning up).	1	2	3	4	5	6	DK	DNA	PNTA
9	Eats a desirable treat all at once rather than keeping some for later (e.g., eats an entire bag of Skittles).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
10	Saves items for a time when he/she might be bored (e.g., saves a new book to read while waiting in doctor's office).	1	2	3	4	5	6	DK	DNA	PNTA
11	Puts a toy in a specific place so that he/she can remember to take it somewhere (e.g., puts show and tell item by the door so he/she remembers it for the following day).	1	2	3	4	5	6	DK	DNA	PNTA
12	Remembers what items need to be purchased/picked-up (e.g., reminds parent to pick up cereal from grocery store).	1	2	3	4	5	6	DK	DNA	PNTA
13	Forgets plans he/she made with friends (e.g., fails to remember to meet a friend on the playground at recess).	1	2	3	4	5	6	DK	DNA	PNTA
14	Will dive into a complicated problem without thinking about possible strategies to use to solve the problem (e.g., starts a puzzle before grouping pieces by colour).	1	2	3	4	5	6	DK	DNA	PNTA
15	Fails to understand that he/she may be able to do something in the future that he/she cannot do now (e.g., he/she thinks he/she will never be able to tie his/her own shoes).	1	2	3	4	5	6	DK	DNA	PNTA
16	Remembers what time he/she is supposed to be places (e.g., at 3 p.m. he/she is due at a friend's house).	1	2	3	4	5	6	DK	DNA	PNTA
17	Fails to understand that his/her activity preferences may change over time (e.g., he/she claims he/she will always love colouring).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
18	Will wait for assistance in assembling an item, even if that means he/she must wait to use the item (e.g., he/she will wait to assemble Lego until parent is available after dinner).	1	2	3	4	5	6	DK	DNA	PNTA
19	Plans what may be required for school/daycare that week (e.g., he/she plans what show and tell item to bring for show and tell).	1	2	3	4	5	6	DK	DNA	PNTA
20	Saves a seat for someone who has not yet arrived (e.g., at the dinner table or at a play).	1	2	3	4	5	6	DK	DNA	PNTA
21	Does not initiate plans for social gatherings (e.g., play-dates with friends).	1	2	3	4	5	6	DK	DNA	PNTA
22	Remembers to pass on messages to family/friends (e.g., tell mom/dad to pick up pizza for dinner when mom/dad picks you up from school).	1	2	3	4	5	6	DK	DNA	PNTA
23	Remembers what he/she said he/she would like to do that day (e.g., watch TV show at 5 pm).	1	2	3	4	5	6	DK	DNA	PNTA
24	Plans routes ahead of time to get somewhere (e.g., cuts through park to reach playground).	1	2	3	4	5	6	DK	DNA	PNTA
25	Thinks the job he/she wants now will be the same job he/she will want when he/she grows up (e.g., he/she thinks he/she will always want to be a circus performer).	1	2	3	4	5	6	DK	DNA	PNTA
26	Struggles to imagine how his/her familiarity with an environment might change over time (e.g., everything is unfamiliar on the first day of school, but becomes more familiar as the school year progresses).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
27	Would rather watch TV/play video games right away, for a short period of time, than for a longer amount of time later.	1	2	3	4	5	6	DK	DNA	PNTA
28	Wants to open all his/her presents immediately rather than waiting for the appropriate day (e.g., birthday, Christmas, Hanukkah, etc.).	1	2	3	4	5	6	DK	DNA	PNTA
29	Forgets to return important forms/permission slips to teacher even after a parent has placed it in his/her backpack.	1	2	3	4	5	6	DK	DNA	PNTA
30	Saves an item to show someone at a later date (e.g., saves artwork to show a relative visiting later in the week).	1	2	3	4	5	6	DK	DNA	PNTA
31	Understands the usefulness of keeping an agenda/calendar to mark upcoming events (e.g., child recognizes parents' use of family calendar to write special events).	1	2	3	4	5	6	DK	DNA	PNTA
32	Eats a large snack and saves no room for dinner.	1	2	3	4	5	6	DK	DNA	PNTA
33	Talks about the way things will be in the future when playing with siblings or other children (e.g., when playing house).	1	2	3	4	5	6	DK	DNA	PNTA
34	Forgets to return items on the due date, even after he/she is reminded by a parent (e.g., return a library book when it is due).	1	2	3	4	5	6	DK	DNA	PNTA
35	Likes to plan what he/she is going to do when he/she arrives somewhere (e.g., plans to go in the pool when he/she visits grandma).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
36	Does not plan what he/she is going to take on a vacation (e.g., does not pack items for a trip in his/her suitcase).	1	2	3	4	5	6	DK	DNA	PNTA
37	Understands that he/she may be hungry later even though he/she has just eaten a large meal.	1	2	3	4	5	6	DK	DNA	PNTA
38	Settles for an item he/she does not really want if he/she can have it right away (e.g., settles for a less desirable toy).	1	2	3	4	5	6	DK	DNA	PNTA
39	Saves enough time to complete a desired task (e.g., puts aside an hour to paint a picture for parent).	1	2	3	4	5	6	DK	DNA	PNTA
40	Involves him/herself in the planning of his/her personal space (e.g., requests specific colour when bedroom is being redecorated).	1	2	3	4	5	6	DK	DNA	PNTA
41	Prefers to win one item with less effort rather than win two items with more effort (e.g., stickers).	1	2	3	4	5	6	DK	DNA	PNTA
42	Plans what items of clothing to wear based on the day's activities (e.g., plans to wear a bathing suit because he/she is going to the beach later that day).	1	2	3	4	5	6	DK	DNA	PNTA
43	Gives reminders to parent or others of something he/she forgot (e.g., reminds his/her parent to pick up Halloween treats for the class).	1	2	3	4	5	6	DK	DNA	PNTA
44	Sets goals and takes steps to achieve those goals (e.g., wishes to learn to swim and asks parent to enroll him/her in swimming lessons).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
45	Saves pocket money for future purchases (e.g., saves money to buy a desirable toy).	1	2	3	4	5	6	DK	DNA	PNTA
46	Does not attempt to revise plans when circumstances have changed (e.g., planned to go to the park tomorrow, but parent is unavailable to take him/her).	1	2	3	4	5	6	DK	DNA	PNTA
47	Will wait in a long line to receive something he/she consider valuable (e.g., will wait in long line to get a picture with a mascot versus simply seeing the mascot).	1	2	3	4	5	6	DK	DNA	PNTA
48	Involves him/herself in the planning of social events (e.g. he/she tells parent which friends he/she would like to invite to his/her party).	1	2	3	4	5	6	DK	DNA	PNTA
49	Fails to anticipate future physical states (e.g., doesn't think about bringing a jacket to the park).	1	2	3	4	5	6	DK	DNA	PNTA
50	Accurately recognizes the responsibilities involved in taking care of another living thing in the future (e.g., new pet or watering a plant).	1	2	3	4	5	6	DK	DNA	PNTA
51	Does not save room for dessert after a big meal.	1	2	3	4	5	6	DK	DNA	PNTA
52	Saves money in a piggy bank for future purchases.	1	2	3	4	5	6	DK	DNA	PNTA
53	Will wait his/her turn to speak at the dinner table instead of interrupting someone else.	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
54	Will share toys with siblings if he/she can play with the toy him/herself for a longer period of time another day.	1	2	3	4	5	6	DK	DNA	PNTA
55	Fails to save a place in line for someone (e.g., does not save a spot in line for a friend who will be late).	1	2	3	4	5	6	DK	DNA	PNTA
56	Does not plan to take appropriate items with them when going out (e.g., does not plan to bring a snack with him/her on a day trip).	1	2	3	4	5	6	DK	DNA	PNTA
57	Forgets what is scheduled for the week (e.g., music lessons after school).	1	2	3	4	5	6	DK	DNA	PNTA
58	Understands that even though he/she is not interested in an activity now, he/she may be interested in that activity at a later time (e.g., he/she might not want to play with his/her sibling today, but may want to play with them tomorrow).	1	2	3	4	5	6	DK	DNA	PNTA
59	Talks about what might happen in the future (e.g., what will happen when he/she moves to a new school).	1	2	3	4	5	6	DK	DNA	PNTA
60	Fails to understand that if he/she feels sick now, he/she will start to feel better in the days to come.	1	2	3	4	5	6	DK	DNA	PNTA
61	Understands that not following instructions at home/school/daycare will have consequences later (e.g., if he/she doesn't clean up when asked, he/she may not get to go outside and play).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
62	Discards items he/she needs at a later time (e.g., throws away items that are needed later for an arts and crafts project).	1	2	3	4	5	6	DK	DNA	PNTA
63	Remembers to bring required items to school/daycare (e.g., change of clothes for gym class or a show and tell item to school).	1	2	3	4	5	6	DK	DNA	PNTA
64	Has a collection of items he/she saves to use in the future (e.g., stickers, rocks, toys, books).	1	2	3	4	5	6	DK	DNA	PNTA
65	Imagines what visiting a new place might be like (e.g., going to Disneyworld and getting Mickey ears).	1	2	3	4	5	6	DK	DNA	PNTA
66	Would rather have one dollar now than wait until the end of the week for five dollars.	1	2	3	4	5	6	DK	DNA	PNTA
67	Remembers to bring appropriate items to specific occasions (e.g., brings a gift to a friend's birthday party, or wears a Halloween costume to school on Halloween).	1	2	3	4	5	6	DK	DNA	PNTA
68	Works hard to perfect skills that will benefit him/her in future tasks (e.g., practices riding his/her bicycle so he/she improves).	1	2	3	4	5	6	DK	DNA	PNTA
69	Seeks the information required for an activity ahead of time (e.g., asks teacher if he/she can bring his/her pet for show and tell).	1	2	3	4	5	6	DK	DNA	PNTA
70	Forgets to bring appropriate clothing for changes in weather (e.g., forgets rain jacket or umbrella when it is going to rain).	1	2	3	4	5	6	DK	DNA	PNTA

	My Child…	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree	Don't Know	Does Not Apply	Prefer Not To Answer
71	Will complete a less enjoyable activity so he/she can participate in a fun activity later (e.g., playing with friends or watching TV).	1	2	3	4	5	6	DK	DNA	PNTA
72	Saves energy for a physically demanding task (e.g., relaxes during the day to save energy for an evening soccer game).	1	2	3	4	5	6	DK	DNA	PNTA
73	Underestimates future physiological needs (e.g., fails to go to the bathroom before a long walk).	1	2	3	4	5	6	DK	DNA	PNTA
74	Forgoes a small treat in the present to receive a larger treat in the future (e.g., he/she would rather have two cookies after dinner versus one cookie before dinner).	1	2	3	4	5	6	DK	DNA	PNTA
75	Forgets important events that are approaching (e.g., sibling's birthday).	1	2	3	4	5	6	DK	DNA	PNTA
76	Thinks about what might be needed for future excursions (e.g., bringing toys/books on a long car ride).	1	2	3	4	5	6	DK	DNA	PNTA
77	Forgets to perform a task requested by a parent (e.g., forgets to retrieve the puzzle box after the child and parent agree to work on a puzzle).	1	2	3	4	5	6	DK	DNA	PNTA
78	Does not plan for future situations ahead of time (e.g., does not plan to bring a gift to his/her friend's birthday).	1	2	3	4	5	6	DK	DNA	PNTA
79	Would rather eat one bite of cake immediately rather than wait longer to eat a whole piece of cake.	1	2	3	4	5	6	DK	DNA	PNTA

Please check that you have answered all the questions!
Thank you for your time in completing the Children's Thinking Questionnaire!

Appendix B: The Children's Thinking Questionnaire Item Guide

Subscale	Scale Items	Reversed Scale Items
Saving	8. Tries to find ways to decrease the amount of time it takes to complete a task (e.g., uses the fastest route to a friend's house when he/she is running late, or uses a box to collect items more quickly when cleaning up). 10. Saves items for a time when he/she might be bored (e.g., saves a new book to read while waiting in doctor's office). 20. Saves a seat for someone who has not yet arrived (e.g., at the dinner table or at a play). 30. Saves an item to show someone at a later date (e.g., saves artwork to show a relative visiting later in the week). 39. Saves enough time to complete a desired task (e.g., puts aside an hour to paint a picture for parent). 45. Saves pocket money for future purchases (e.g., saves money to buy a desirable toy). 52. Saves money in a piggy bank for future purchases. 64. Has a collection of items he/she saves to use in the future (e.g., stickers, rocks, toys, books). 72. Saves energy for a physically demanding task (e.g., relaxes during the day to save energy for an evening soccer game).	4. Does not consider how long it will take to save up for a desired item (e.g., does not consider how many stickers he/she must earn to get a prize). 32. Eats a large snack and saves no room for dinner. 51. Does not save room for dessert after a big meal 55. Fails to save a place in line for someone (e.g., does not save a spot in line for a friend who will be late). 62. Discards items he/she needs at a later time (e.g., throws away items that are needed later for an arts and crafts project).

Subscale	Scale Items	Reversed Scale Items
Prospective Memory	12. Remembers what items need to be purchased/picked-up (e.g., reminds parent to pick up cereal from grocery store). 16. Remembers what time he/she is supposed to be places (e.g., at 3 p.m. he/she is due at a friend's house). 22. Remembers to pass on messages to family/friends (e.g., tell mom/dad to pick up pizza for dinner when mom/dad picks you up from school). 23. Remembers what he/she said he/she would like to do that day (e.g., watch TV show at 5 pm). 43. Gives reminders to parent or others of something he/she forgot (e.g., reminds his/her parent to pick up Halloween treats for the class). 63. Remembers to bring required items to school/daycare (e.g., change of clothes for gym class or a show and tell item to school). 67.Remembers to bring appropriate items to specific occasions (e.g., brings a gift to a friend's birthday party, or wears a Halloween costume to school on Halloween).	3. Forgets to inform parents or teachers of his/her whereabouts (e.g., goes to the bathroom without telling the teacher). 13. Forgets plans he/she made with friends (e.g., fails to remember to meet a friend on the playground at recess). 29. Forgets to return important forms/permission slips to teacher even after a parent has placed it in his/her backpack. 34. Forgets to return items on the due date, even after he/she is reminded by a parent (e.g., return a library book when it is due). 57. Forgets what is scheduled for the week (e.g., music lessons after school). 70. Forgets to bring appropriate clothing for changes in weather (e.g., forgets rain jacket or umbrella when it is going to rain). 75. Forgets important events that are approaching (e.g., sibling's birthday). 77. Forgets to perform a task requested by a parent (e.g., forgets to retrieve the puzzle box after the child and parent agree to work on a puzzle).

Subscale	Scale Items	Reversed Scale Items
Episodic Future Thinking	7. Understands that a currently irrelevant object might be useful in the future (e.g., realizes a key might be used to open something). 33. Talks about the way things will be in the future when playing with siblings or other children (e.g., when playing house). 37. Understands that he/she may be hungry later even though he/she has just eaten a large meal. 50. Accurately recognizes the responsibilities involved in taking care of another living thing in the future (e.g., new pet or watering a plant). 58. Understands that even though he/she is not interested in an activity now, he/she may be interested in that activity at a later time (e.g., he/she might not want to play with his/her sibling today, but may want to play with them tomorrow). 59. Talks about what might happen in the future (e.g., what will happen when he/she moves to a new school). 61. Understands that not following instructions at home/school/daycare will have consequences later (e.g., if he/she doesn't clean up when asked, he/she may not get to go outside and play). 65. Imagines what visiting a new place might be like (e.g., going to Disneyworld and getting Mickey ears). 76. Thinks about what might be needed for future excursions (e.g., bringing toys/books on a long car ride).	6. Fails to understand that current and future desires can differ (e.g., when he/she wakes up in the morning full of energy, he/she may not think he/she will be tired at night time). 15. Fails to understand that he/she may be able to do something in the future that he/she cannot do now (e.g., he/she thinks he/she will never be able to tie his/her own shoes). 17. Fails to understand that his/her activity preferences may change over time (e.g., he/she claims he/she will always love coloring). 25. Thinks the job he/she wants now will be the same job he/she will want when he/she grows up (e.g., he/she thinks he/she will always want to be a circus performer). 26. Struggles to imagine how his/her familiarity with an environment might change over time (e.g., everything is unfamiliar on the first day of school, but becomes more familiar as the school year progresses). 49. Fails to anticipate future physical states (e.g., doesn't think about bringing a jacket to the park). 60. Fails to understand that if he/she feels sick now, he/she will start to feel better in the days to come. 73. Underestimates future physiological needs (e.g., fails to go to the bathroom before a long walk).

Subscale	Scale Items	Reversed Scale Items
Planning	5. Makes a plan before tackling a difficult task (e.g., lays out all pieces of an item before assembling). 11. Puts a toy in a specific place so that he/she can remember to take it somewhere (e.g., puts a show and tell item by the door so he/she remembers to take it to school the following day). 19. Plans what may be required for school/daycare that week (e.g., he/she plans what show and tell item to bring for show and tell). 24. Plans routes ahead of time to get somewhere (e.g., cuts through park to reach playground). 31. Understands the usefulness of keeping an agenda/calendar to mark upcoming events (e.g., he/she recognizes parents' use of family calendar to write special events. 35. Likes to plan what he/she is going to do when he/she arrives somewhere (e.g., plans to go in the pool when he/she visits grandma). 40. Involves him/herself in the planning of his/her personal space (e.g., requests specific colour when bedroom is being redecorated). 42. Plans what items of clothing to wear based on the day's activities (e.g., plans to wear a bathing suit because he/she is going to the beach later that day). 44. Sets goals and takes steps to achieve those goals (e.g., wishes to learn to swim and asks parent to enroll him/her in swimming lessons). 48. Involves him/herself in the planning of social events (e.g. he/she tells parents which friends he/she would like to invite to his/her party). 69. Seeks the information required for an activity ahead of time (e.g., asks teacher if he/she can bring his/her pet for show and tell).	14. Will dive into a complicated problem without thinking about possible strategies to use to solve the problem (e.g., starts a puzzle before grouping pieces by colour). 21. Does not initiate plans for social gatherings (e.g., play-dates with friends). 36. Does not plan what he/she is going to take on a vacation (e.g., does not pack items for a trip in his/her suitcase). 46. Does not attempt to revise plans when circumstances have changed (e.g., planned to go to the park tomorrow, but parent is unavailable to take him/her). 56. Does not plan to take appropriate items with them when going out (e.g., does not plan to bring a snack with him/her on a day trip). 78. Does not plan for future situations ahead of time (e.g., does not plan to bring a gift to his/her friend's birthday).

Subscale	Scale Items	Reversed Scale Items
Delay of Gratification	2. Performs chores or tasks in advance of a desirable outing (e.g., cleans room before dinner so he/she can attend sibling's soccer game after dinner). 18. Will wait for assistance in assembling an item, even if that means he/she must wait to use the item (e.g., he/she will wait to assemble Lego until parent is available after dinner). 47. Will wait in a long line to receive something he/she considers valuable (e.g., he/she will wait in long line to get a picture with a mascot versus simply seeing the mascot). 54. Will share toys with siblings if he/she can play with the toy him/herself for a longer period of time another day. 53. Will wait his/her turn to speak at the dinner table instead of interrupting someone else. 68. Works hard to perfect skills that will benefit him/herself in future tasks (e.g., practices riding his/her bicycle so he/she improves). 71. Will complete a less enjoyable activity so he/she can participate in a fun activity later (e.g., playing with friends or watching TV). 74. Forgoes a small treat in the present to receive a larger treat in the future (e.g., he/she would rather have two cookies after dinner versus one cookie before dinner).	1. Will not eat healthy foods at dinner even if he/she won't get dessert as a consequence. 9. Eats a desirable treat all at once rather than keeping some for later (e.g., eats an entire bag of Skittles). 27.Would rather watch TV/play video games right away, for a short period of time, than for a longer amount of time later. 28. Wants to open all his/her presents immediately rather than waiting for the appropriate day (e.g., birthday, Christmas, Hanukkah, etc.). 38. Settles for an item he/she does not really want if he/she can have it right away (e.g., settles for a less desirable toy). 41. Prefers to win one item with less effort rather than win two items with more effort (e.g., stickers). 66. Would rather have one dollar now than wait until the end of the week for five dollars. 79. Would rather eat one bite of cake immediately rather than wait longer to eat a whole piece of cake.

Appendix C: Brock University Research Ethics Board Approval

Brock University
Research Ethics Office
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Social Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: February 26, 2016

PRINCIPAL INVESTIGATOR: MAHY, Caitlin - Psychology

FILE: 15-105 - MAHY

TYPE: Masters Thesis/Project STUDENT: Tessa Mazachowsky
SUPERVISOR: Caitlin Mahy

TITLE: Constructing a Parent-Report on Children's Future Oriented Cognition

ETHICS CLEARANCE GRANTED

Type of Clearance: MODIFICATION Expiry Date: 12/30/2016

The Brock University Social Sciences Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement.

Modification: Additional locations for data collection and minor changes to methodology.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before **12/30/2016**. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at http://www.brocku.ca/research/policies-and-forms/research-forms.

In addition, throughout your research, you must report promptly to the REB:

a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved: 

Kimberly Maich, Chair
Social Sciences Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.